Appendix E
2008 Base Year Emissions Inventory for the Missouri Portion of the St. Louis $PM_{2.5}$ Nonattainment Area

Missouri Department of Natural Resources
Division of Environmental Quality
Air Pollution Control Program
Jefferson City, Missouri

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1.0 Introduction

1.1 Purpose

This document meets the nonattainment plan provisions under the Clean Air Act Section 172 (c)(3):

> *"Such plan provisions shall include a comprehensive, accurate, current inventory of actual emissions from all sources of the relevant pollutant or pollutants in such area, including such periodic revisions as the Administrator may determine necessary to assure that the requirements of this part are met."*

Missouri's redesignation request and maintenance plan for the 1997 $PM_{2.5}$ National Ambient Air Quality Standard (NAAQS) require a base year emissions inventory for 2008. The inventory is comprehensive in it's inclusion of multiple source categories (point, nonpoint or area, and mobile sources), it is accurate based on the quality assurance steps outlined in Section 4, contains current 2008 actual emissions for the pollutants of concern for $PM_{2.5}$, and can be updated through the triennial National Emissions Inventory (NEI). Emissions are documented for both the statewide inventory and the St. Louis Nonattainment (STLNA) counties. Though the nonattainment area is bi-state, the inventory documentation that follows covers the five-county Missouri portion of the nonattainment area.

1.2 Inventory Coverage

1.2.1 Geography

The inventory covers the St. Louis Nonattainment counties of Jefferson, Franklin, St. Charles, and St. Louis Counties and the City of St. Louis. Several summaries of statewide Missouri totals are also included for reference. There are no inventory components provided by local or tribal agencies.

1.2.2 Emission Year

Emission year 2008 is the base year, including both annual emissions for the entire state and ozone season day emissions for the Missouri St. Louis Ozone Nonattainment Area.

1.2.3 Pollutants

The pollutants covered in the inventory are the criteria pollutants SO_2, NO_x, PM_{10} Primary (and it's components PM_{10} Filterable and PM Condensable), $PM_{2.5}$ Primary (and it's components $PM_{2.5}$ Filterable and PM Condensable), VOC, and CO.

1.3 Contents of Report

This report documents the 2008 inventory in detail, from it's creation, quality assurance, and final summaries. It also details the qualifications and limitations of the inventory. The document is arranged by purpose, emission summaries, documentation, quality assurance, and detailed appendices with lengthy emissions data tables and EPA provided category documentation.

1.4 Automated Systems Used

The 2008 emission inventory is maintained across multiple computing systems. Point source inventories are compiled from facility-supplied information in the Missouri Emissions Inventory System (MoEIS) database. Point sources are allowed to submit their inventory data via the MoEIS web interface or on hardcopy paper forms which are data entered to the electronic system. Nonpoint emissions are calculated using Microsoft® Excel spreadsheet and Access database tools. Mobile emissions are estimated using EPA's Motor Vehicle Emissions Simulator (MOVES), the MOBILE6 model, and the National Mobile Inventory Model (NMIM) which incorporates the NONROAD2008 model.

1.5 Inventory Exclusions

This 2008 inventory does not include biogenic or geogenic emissions. The inventory does not include the nonpoint categories for wildfire, prescribed, or agricultural burning, agricultural tilling, plus others described in section 3.2.2. This inventory does not include hazardous air pollutant (HAP) inventories as they are not relevant pollutants for the Ozone and $PM_{2.5}$ nonattainment plans. The HAP inventory is documented in Missouri's 2008 National Emissions Inventory Documentation and is available on EPA's NEI page at http://www.epa.gov/ttn/chief/net/2008inventory.html. Point emissions data is summarized at the facility level in this document, though facility operational data and emission process data is collected and submitted to the NEI.

1.6 Guidance and Reference Documents

This document is completed with the following references:

- Emissions Inventory Guidance for Implementation of Ozone and Particulate matter National Ambient Air Quality Standards (NAAQS) and Regional Haze Regulations (August 2005, EPA-454/R-05-001, http://www.epa.gov/ttnchie1/eidocs/eiguid/index.html)
- Emission Inventory Improvement Plan (EIIP) (July 1997, http://www.epa.gov/ttn/chief/eiip/index.html)
- 2008 National Emissions Inventory Data version 1.5 and documentation (May 2011, http://www.epa.gov/ttn/chief/net/2008inventory.html)

- Air Emission Reporting Rule (Dec 2008, http://www.epa.gov/ttn/chief/aerr/)
- AP-42, Compilation of Air Pollutant Emission Factors (http://www.epa.gov/ttn/chief/ap42/index.html)
- MOVES Technical Guidance, Policy Memos, etc at (http://www.epa.gov/otaq/models/moves/index.htm)
- National Mobile Inventory Model (NMIM) (http://www.epa.gov/oms/nmim.htm)

1.7 List of Contacts

The emission inventory is compiled by Stacy Allen, Environmental Specialist IV and Emission Inventory/Data Management Unit Chief with the Missouri Department of Natural Resources. Specific contacts for other portions of the inventory are:

Point and Nonpoint Emissions: Stacy Allen, stacy.allen@dnr.mo.gov
Mobile (Onroad and Nonroad) Emissions: Nathan O'Neil, nathan.o'neil@dnr.mo.gov

2.0 Emissions Summary

2.1 Summary by County and Category

Table 1 STLNA Total Emissions by County and Category (tons per year)

	County Name	NO_X	PM_{10}-PRI	$PM_{2.5}$-PRI	SO_2	VOC
Point	Franklin	9,178.19	2,380.91	1,448.96	57,944.69	685.48
	Jefferson	7,016.40	1,968.50	945.65	68,569.22	600.04
	St. Charles	7,649.32	377.96	316.21	48,595.24	936.97
	St. Louis	5,843.53	1,024.22	510.91	20,861.90	1,689.72
	St. Louis City	1,415.83	721.95	271.66	5,729.67	1,155.67
	Point Totals	**31,103.27**	**6,473.54**	**3,493.39**	**201,700.72**	**5,067.88**
Nonpoint	Franklin	295.22	17,974.75	2,109.54	992.76	1,534.94
	Jefferson	402.74	29,264.18	3,493.58	910.13	3,158.50
	St. Charles	463.77	14,262.61	1,734.42	899.09	5,686.72
	St. Louis	2,228.20	32,095.22	4,137.64	5,458.17	20,252.98
	St. Louis City	1,036.38	8,747.03	1,220.31	3,277.89	7,682.83
	Nonpoint Totals	**4,426.31**	**102,343.80**	**12,695.50**	**11,538.04**	**38,315.97**
Onroad	Franklin	4,165.14	137.51	131.56	30.12	1,499.34
	Jefferson	5,284.46	177.63	169.62	36.32	2,424.59
	St. Charles	7,745.99	272.43	260.16	54.30	3,476.51
	St. Louis	32,193.73	1,156.41	1,105.71	237.05	12,419.57
	St. Louis City	9,119.82	334.16	319.94	68.87	3,132.81
	Onroad Totals	**58,509.15**	**2,078.14**	**1,986.99**	**426.65**	**22,952.81**
Nonroad	Franklin	1,851.03	108.28	101.88	24.16	1,005.10
	Jefferson	1,102.73	90.11	85.77	26.17	944.14
	St. Charles	2,945.21	217.36	207.63	77.57	1,985.65
	St. Louis	6,503.78	597.67	567.32	119.08	6,524.02
	St. Louis City	9,053.06	349.23	336.98	477.12	1,257.26
	Nonroad Totals	**21,455.81**	**1,362.66**	**1,299.57**	**724.09**	**11,716.17**
	STLNA Total	**115,49454**	**112,258.14**	**19,475.45**	**214,389.50**	**78,052.83**

3.0 Inventory Documentation

3.1 Point Source Emissions

3.1.1 Procedures and Methodologies

The point source inventory is based on information collected on Emissions Inventory Questionnaires (EIQs). Facilities with a construction or operating permit from the Air Pollution Control Program are required to submit an EIQ on an annual basis per 10 CSR 10-6.110. The EIQ details the amount of air pollution emitted and other operational data for the previous calendar year.

2008 point sources include those with Part 70 and Intermediate operating permits. The EIQ solicitation was mailed to facilities in January 2009. The due date for 2008 reporting was June 1, 2009, and all point source reports were received and included in this document summary.

3.1.2 Emission Inventory Questionnaire (EIQ)

All point source emissions data for the State of Missouri is contained in a database called the Missouri Emissions Inventory System (MoEIS). Emission reports may be submitted either directly via the MoEIS web interface, a user-friendly, online portal linked directly to the MoEIS database, or they may be submitted on the hardcopy EIQ forms. Hardcopy EIQ submittals are then data entered into the MoEIS database by EI unit staff members. As a result, the MoEIS database is updated yearly with the most current emissions data for the State of Missouri.

Hardcopy EIQ forms are described in Table 2. All hardcopy forms have an electronic counterpart in the MoEIS web interface system. In general, forms beginning with number one (1) provide general information about a facility, forms beginning with a two (2) provide the detailed annual emission calculations, including activity or throughput, emission factors, emissions, and operational characteristics. More information on EIQ forms and instructions and MoEIS is available at http://www.dnr.mo.gov/env/apcp/moeis/emissionsreporting.htm

Table 2 List of EIQ Forms

FORM NAME	FORM DESCRIPTION	FORM NUMBER
FORM 1.0 GENERAL PLANT INFORMATION	GENERAL PLANT INFORMATION, PLANT-WIDE EMISSIONS TOTALS, SIGNATURE SECTION CERTIFYING SUBMITTED INFORMATION IS ACCURATE AND COMPLETE	780-1431
FORM 1.1 PROCESS FLOW DIAGRAM	DIAGRAM IDENTIFYING AND LINKING ALL EMISSION UNITS, PROCESSES, AIR POLLUTION CONTROL DEVICES, AND EMISSION RELEASE POINTS FOR A FACILITY. SUBMIT ONLY IF THERE HAVE BEEN CHANGES.	780-1619

FORM NAME	FORM DESCRIPTION	FORM NUMBER
FORM 1.2 SUMMARY OF EMISSION UNITS AND RELATED PROCESSES	LIST OF ALL EMISSION UNITS AND ASSOCIATED PROCESSES AND THE STATUS OF EACH (ACTIVE, INSIGNIFICANT, DISMANTLED)	780-1620
FORM 2.0 EMISSION UNIT INFORMATION	MAIN EMISSIONS REPORTING FORM; SEPARATE FORM 2.0 REQUIRED FOR EACH PROCESS FOR WHICH EMISSIONS ARE BEING REPORTED (I.E., FORM 2.0 NOT REQUIRED FOR EMISSIONS BELOW REPORTING THRESHOLDS)	780-1621
FORM 2.0C CONTROL DEVICE INFORMATION	CONTROL DEVICE INFORMATION WHEN THERE IS A CONTROL DEVICE OPERATIVE AT AN EMISSION UNIT; SEPARATE FORM 2.0C REQUIRED FOR EACH CONTROL DEVICE	780-1434
FORM 2.0K CHARCOAL KILN INFORMATION	DETAILS THE OPERATIONS AND CHARACTERISTICS OF CHARCOAL KILNS	780-1530
FORM 2.0L LANDFILL INFORMATION	FORM FOR REPORTING EMISSIONS FROM LANDFILLS	780-1583
FORM 2.0P PORTABLE EQUIPMENT INFORMATION	DETAILS THE LOCATIONS AND OPERATIONS FOR PORTABLE EQUIPMENT OPERATIONS INCLUDING QUARRIES, ASPHALT PLANTS, AND CONCRETE BATCH PLANTS	780-1433
FORM 2.0S STACK/VENT INFORMATION	STACK INFORMATION FOR EMISSION UNITS WHERE EMISSIONS FROM A PROCESS ENTER THE AMBIENT AIR THROUGH ONE OR MORE STACKS/VENTS	780-1435
FORM 2.0Z OZONE SEASON INFORMATION FORM	CALCULATION OF OZONE SEASON DAY EMISSIONS OF VOC, NO_X, OR CO; REQUIRED FROM FACILITIES LOCATED IN ST. LOUIS, ST. CHARLES, FRANKLIN AND JEFFERSON COUNTIES AND ST. LOUIS CITY WITH 10 TONS OR MORE OF VOC, NO_X OR CO ANNUAL EMISSIONS.	780-1452
FORM 2.1 FUEL COMBUSTION WORKSHEET	INFORMATION RELATED TO COMBUSTION EQUIPMENT, FUEL USAGE, AND THE CALCULATIONS ASSOCIATED WITH COMBUSTION PROCESSES	780-1436
FORM 2.2 INCINERATOR WORKSHEET	INFORMATION RELATED TO THE INCINERATOR, WASTE MATERIAL(S) INCINERATED, AND THE ANNUAL WASTE MATERIAL THROUGHPUT	780-1438
FORM 2.3 VOC PROCESS MASS-BALANCE WORKSHEET	CALCULATES A VOC MASS BALANCE EMISSION FACTOR	780-1440

FORM NAME	FORM DESCRIPTION	FORM NUMBER
FORM 2.4 VOLATILE ORGANIC LIQUID LOADING WORKSHEET	CALCULATES AN EMISSION FACTOR FOR PETROLEUM LIQUID LOADING INTO TANK TRUCKS, RAIL CARS, AND BARGES BASED ON AP-42	780-1625
FORM 2.5L GENERAL LIQUID STORAGE TANK INFORMATION	INFORMATION ABOUT STORAGE TANKS	780-1444
FORM 2.7 HAUL ROAD FUGITIVE EMISSIONS WORKSHEET	CALCULATES AN EMISSION FACTOR FOR UNPAVED HAUL ROADS BASED ON AP-42 FORMULA	780-1445
FORM 2.8 STORAGE PILE WORKSHEET	CALCULATES EMISSION FACTORS FOR ACTIVITY AND WIND EROSION FROM STORAGE PILES BASED ON AP-42 FORMULAS	780-1446
FORM 2.9 STACK TEST/CONTINUOUS EMISSION MONITORING WORKSHEET	DOCUMENTATION FOR EMISSION FACTORS DERIVED FROM STACK TESTS OR CEM DEVICES	780-1447
FORM 2.T HAZARDOUS AIR POLLUTANT WORKSHEET	INFORMATION ON HAP CHEMICALS EMITTED AT THE PROCESS LEVEL; SEPARATES INDIVIDUAL HAPS FROM THOSE INCLUDED IN VOC/PM EMISSIONS	780-1448
FORM 3.0 EMISSION FEE CALCULATION	SUMMARY TABLE SHOWING EMISSIONS FROM ALL PROCESSES	780-1509
FORM 3.0CK EMISSION FEE CALCULATION FOR CHARCOAL KILNS	SUMMARY TABLE SHOWING EMISSIONS FROM CHARCOAL KILN OPERATIONS	780-1508
DRY CLEANER – NON-CHLORINATED AND PETROLEUM BASED SOLVENTS	EMISSIONS CALCULATIONS FOR DRY CLEANERS USING NON-CHLORINATED SOLVENT AND WITH COMBINED DRYER CAPACITY OF 84 POUNDS OR MORE	780-1954
FORM 4.0 FINANCIAL COST ESTIMATE	ESTIMATE THE COST OF COMPLYING WITH AIR POLLUTION REGULATION	780-1622

Point source EIQ data received via hard copy forms is data entered to the MoEIS emissions database by emission inventory staff. During this step, process-level emissions and operational information are checked for consistency between the hardcopy forms and database calculations, and inconsistencies are flagged for review. Problems include, but are not limited to:

Incorrect Source Classification Codes (SCCs)

Emission unit numbering changes
Calculation errors
Missing or incomplete records
Transposition errors

If no errors are found during data entry, and the emissions reported on the hardcopy full EIQ match what is calculated by the MoEIS database, then the emission report is considered complete and data entered.

EIQs with inconsistencies are moved from emission inventory data entry staff to a member of the technical review team. The technical review team will address the problems encountered during data entry by identifying the specific issue(s) and possible causes and contacting the facility to resolve those issues. Other issues may also be addressed during the review, including the appropriate use of emission estimation methods, documentation of source data, and consistency with permit emission calculations. Supplemental EIQ information may be collected by staff via telephone or email contact with the facility in question. Information collected in this manner will be recorded on the EIQ for reference, tracking and QA auditing. If the facility is requested to submit follow up verification or additional information in writing, a statement pertaining to this request will also be recorded on the EIQ. The information recorded will include the date of the call or contact, staff person's name, contact person's name, and written documentation of the call.

After the submission deadline of June 1 has passed, a list of unsubmitted EIQs is generated and sent to the compliance and enforcement section of the Air Pollution Control Program. With all emissions data contained in the MoEIS database, further quality assurance steps are completed as described in Section 4.

3.1.3 List of Facilities and Emissions

There are 139 facilities in the point source inventory for the Missouri counties of the St. Louis nonattainment area. Their primary economic activity described by their North American Industry Classification System (NAICS) code is listed in Table 3 by county. The emissions of each facility in tons per year are listed in Table 4**Error! Reference source not found.**.

Table 3 STLNA Point Sources by NAICS

Primary Economic Activity Description	Franklin	Jefferson	St. Charles	St. Louis	St. Louis City
Adhesive Manufacturing				1	1
Administration of Air and Water Resource and Solid Waste Management Programs					1
Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Manufacturing			1		
Aircraft Manufacturing				1	
All Other Basic Organic Chemical Manufacturing					1
All Other Miscellaneous Textile Product Mills					1

Primary Economic Activity Description	Franklin	Jefferson	St. Charles	St. Louis	St. Louis City
All Other Rubber Product Manufacturing					1
Asphalt Paving Mixture and Block Manufacturing			1	6	1
Automobile Manufacturing			1	2	
Biological Product (except Diagnostic) Manufacturing					1
Breweries					1
Carburetor, Piston, Piston Ring, and Valve Manufacturing				1	
Cement Manufacturing		1			
Coated and Laminated Packaging Paper Manufacturing				1	
Coffee and Tea Manufacturing					1
Colleges, Universities, and Professional Schools				1	1
Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance				1	
Commercial and Institutional Building Construction					1
Commercial Bakeries					1
Commercial Flexographic Printing				1	
Commercial Lithographic Printing				2	2
Crushed and Broken Limestone Mining and Quarrying		2	1	3	
Dry Pasta Manufacturing					1
Electronic Coil, Transformer, and Other Inductor Manufacturing			1		
Electroplating, Plating, Polishing, Anodizing, and Coloring	1	1			
Fabric Coating Mills	1				
Fabricated Structural Metal Manufacturing	1				
Farm Supplies Merchant Wholesalers					1
Flour Milling					2
Folding Paperboard Box Manufacturing	1				
Fossil Fuel Electric Power Generation	1	1	1	1	1
General Medical and Surgical Hospitals			1	5	3
General Warehousing and Storage					1
Glass Container Manufacturing		1			
Glass Product Manufacturing Made of Purchased Glass				1	
Grain and Field Bean Merchant Wholesalers					1
Heating Equipment (except Warm Air Furnaces) Manufacturing					1
Industrial Sand Mining				1	
Industrial Valve Manufacturing	1				
Inorganic Dye and Pigment Manufacturing				1	1
Institutional Furniture Manufacturing				1	
Iron and Steel Pipe and Tube Manufacturing from Purchased Steel	1				
Laminated Aluminum Foil Manufacturing for Flexible Packaging Uses					1
Leather and Hide Tanning and Finishing					1
Machine Tool (Metal Cutting Types) Manufacturing				1	
Manifold Business Forms Printing					1
Metal Can Manufacturing		1			
Metal Coating, Engraving (except Jewelry and Silverware), and Allied Services to Manufacturers					2
Motor Vehicle Body Manufacturing	1				

Primary Economic Activity Description	Franklin	Jefferson	St. Charles	St. Louis	St. Louis City
Motor Vehicle Seating and Interior Trim Manufacturing	1				
National Security					1
Natural Gas Distribution					1
Natural Gas Liquid Extraction					2
Newspaper Publishers				1	1
Offices of Physicians (except Mental Health Specialists)					1
Other Aircraft Parts and Auxiliary Equipment Manufacturing				1	
Other Metal Container Manufacturing				1	
Other Metal Valve and Pipe Fitting Manufacturing	1				1
Paint and Coating Manufacturing					3
Pesticide and Other Agricultural Chemical Manufacturing				1	
Petrochemical Manufacturing				1	2
Petroleum Bulk Stations and Terminals				1	
Pharmaceutical Preparation Manufacturing				3	
Plastics Material and Resin Manufacturing		1		1	
Polystyrene Foam Product Manufacturing			1	1	
Primary Smelting and Refining of Nonferrous Metal (except Copper and Aluminum)		1			
Railroad Rolling Stock Manufacturing		1			
Research and Development in the Physical, Engineering, and Life Sciences				1	
Rubber and Plastics Hoses and Belting Manufacturing				1	
Secondary Smelting and Alloying of Aluminum					1
Semiconductor and Related Device Manufacturing			1		
Sewage Treatment Facilities				3	
Ship Building and Repairing		1			
Sign Manufacturing	1				
Soap and Other Detergent Manufacturing					2
Solid Waste Landfill				4	
Spice and Extract Manufacturing	2				1
Steel Foundries (except Investment)		1			
Steel Investment Foundries			1		
Toy and Hobby Goods and Supplies Merchant Wholesalers					1
Truck Trailer Manufacturing				1	
Unlaminated Plastics Profile Shape Manufacturing	2		1		
Wired Telecommunications Carriers					1
Total Number of Facilities	15	12	11	52	49

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Table 4 STLNA Point Source Listing by Facility (tons per year)

County	Site ID	Facility Name	CO	NH_3	NO_X	PM_{10}-PRI	$PM_{2.5}$-PRI	SO_2	VOC
Franklin	0003	Amerenue-Labadie Plant	2,494.33	2.82	9,170.39	2,371.99	1,446.08	57,944.63	299.61
Franklin	0014	Canam Steel Corp	0.14		2.54	0.83		0.03	57.77
Franklin	0020	Steelweld Equipment Co-St Clair	0.17		0.20	0.04		0.00	15.94
Franklin	0031	Jefferson Smurfit Corp-Pacific	-	-	-	-	-		29.68
Franklin	0068	Meramec Industries Inc-Ramsey St Plant	0.06		0.31	0.68		0.00	37.84
Franklin	0087	Bull Moose Tube Company	0.32		0.55	0.35	0.06	0.00	18.70
Franklin	0131	Sullivan Precision Metal Finishing Inc	-		-	-	-	-	18.58
Franklin	0132	Sporlan Valve Company-Plant #2 - West Main							43.42
Franklin	0144	Integram - St Louis Seating-Pacific	0.48		0.58	0.04	0.04	0.00	18.61
Franklin	0151	Aerofil Technology Inc	0.39		1.95	6.94	2.77	0.01	50.17
Franklin	0153	Magnet Llc-Washington							9.73
Franklin	0154	Marble Decor Inc	-		-	-		-	0.45
Franklin	0157	Plaze Incorporated	0.35		1.67	0.05		0.01	44.87
Franklin	0173	GDX Automotive - Danny Scott Drive-New Haven			0.00			-	23.67
Franklin	0178	Sporlan Valve Company-Plant #3 - Lange Drive							16.46
Jefferson	0002	Rc Cement Company Inc-River Cement Co - Selma Plant	302.96	5.70	2,608.15	630.01	197.39	2,758.03	195.65
Jefferson	0003	Doe Run Company-Herculaneum Smelter	23.25	0.38	12.32	14.68	10.83	35,997.75	2.20

County	Site ID	Facility Name	CO	NH_3	NO_X	PM_{10}-PRI	$PM_{2.5}$-PRI	SO_2	VOC
Jefferson	0011	Union Pacific Railroad Co-Desoto Car Shop	1.27		1.77	3.05	2.52	0.01	17.56
Jefferson	0012	Trautman Quarry-Pevely				5.23	-		-
Jefferson	0014	Dow Chemical Company The-Riverside Plant	1.11	0.04	1.32	0.16	0.10	0.01	1.42
Jefferson	0016	Amerenue-Rush Island Plant	1,333.35	1.51	4,195.26	1,180.92	662.52	29,592.97	159.93
Jefferson	0044	Metal Container Corporation-Arnold	9.43		11.26	2.79	2.79	0.07	111.91
Jefferson	0052	Engineered Coil Company-D B A Marlo Coil	0.02		0.12	0.00		0.00	9.47
Jefferson	0068	Saint-Gobain Containers Llc-Pevely	8.30	1.27	177.56	71.90	69.26	219.84	31.69
Jefferson	0103	Bussen Quarries Inc-Antire Quarry				23.57	0.09		-
Jefferson	0111	Carondelet Corporation	4.14	0.07	6.48	36.10	0.16	0.25	67.10
Jefferson	0114	Aero Metal Finishing			2.16	0.09		0.30	3.10
St. Charles	0001	Amerenue-Sioux Plant	765.30	0.86	7,336.12	347.78	308.71	48,147.62	168.11
St. Charles	0004	Fred Weber Inc-O'Fallon Asphalt Plant	15.54	0.04	2.06	1.02	0.12	0.17	0.36
St. Charles	0007	Fred Weber Inc-O'Fallon Stone Plant				7.03	0.01		
St. Charles	0010	McDonnell Douglas Corp-Boeing Company	2.15	0.08	2.56	0.37	0.05	0.02	14.85
St. Charles	0019	St Joseph Health Center	3.18	0.03	4.67	2.10	0.35	0.14	0.28
St. Charles	0027	Memc Electronic Materials Inc-St Peters Plant	10.07	5.11	23.58	8.48	4.47	0.14	15.08
St. Charles	0076	General Motors-Wentzville Center	101.51	0.34	274.20	9.89	1.54	447.12	550.70
St. Charles	0077	O Fallon Casting Llc-O Fallon	1.55	1.59	1.85	0.69	0.60	0.01	89.98

County	Site ID	Facility Name	CO	NH_3	NO_X	PM_{10}-PRI	$PM_{2.5}$-PRI	SO_2	VOC
St. Charles	0129	Woodbridge Corporation-St Peters	-	-	-	-	-		49.74
St. Charles	0131	Superior Home Products Inc	-		-	0.24		-	10.79
St. Charles	0184	True Manufacturing Co-O'Fallon	1.39		4.29	0.36	0.36	0.03	37.09
St. Louis	0002	Chrysler Assembly Plant 1-Fenton	21.86	0.83	25.86	4.81	3.38	0.16	203.84
St. Louis	0010	Amerenue-Meramec Plant	3,811.99	1.30	5,331.86	795.96	461.34	20,826.77	109.35
St. Louis	0017	Fred Weber Inc-North Stone				71.70	4.96		
St. Louis	0019	Fred Weber Inc-South Stone				13.89	0.02		
St. Louis	0020	Monsanto World Headquarters-Lindbergh Blvd	10.33	0.39	12.29	0.93	0.23	0.07	0.68
St. Louis	0021	U S Silica Company-Pacific	3.51	0.13	4.18	4.41	2.96	0.03	0.23
St. Louis	0025	Dana Corporation-Perfect Circle Division	0.87	0.01	1.04	0.08	0.02	0.01	1.73
St. Louis	0032	Pharmacia-Chesterfield Village	14.82	0.44	15.36	1.17	0.27	0.36	20.66
St. Louis	0035	Rockwood Pigments Na Inc-E Hoffmeister	8.27	0.37	12.09	3.09	0.24	3.53	0.71
St. Louis	0042	Washington University-Millbrook Blvd	18.42	0.70	22.45	9.11	0.45	0.25	1.24
St. Louis	0057	St Louis Post-Dispatch-Dunlap Ind Dr	0.16	0.00	0.19	0.01	0.00	0.00	19.15
St. Louis	0064	Sunnen Products Company-Maplewood	1.01	0.04	1.21	0.09	0.02	0.01	5.77
St. Louis	0065	St Louis Airport Authority-Lambert International Blvd	9.38	0.32	14.92	7.97	0.28	3.09	11.67
St. Louis	0111	Simpson Construction Materials Llc-West Lake Quarry & Material Co	15.71		4.71	3.02	0.08	3.46	0.32

County	Site ID	Facility Name	CO	NH_3	NO_X	PM_{10}-PRI	$PM_{2.5}$-PRI	SO_2	VOC
St. Louis	0141	Energy Petroleum Company-Kienlen							7.19
St. Louis	0208	Printpack Inc-Hazelwood Plant	3.45	0.13	4.11	0.31	0.08	0.02	233.46
St. Louis	0217	Metropolitan St Louis Sewer District-Lemay Waste Water Treatment Plant	321.07	505.36	51.79	4.72	1.86	2.07	18.63
St. Louis	0226	Nesco Container Corp-Fenton	1.07	0.04	2.36	0.18	0.02	0.01	93.66
St. Louis	0230	McDonnell Douglas Corp /Boeing Company-Lindbergh Plant	20.96	0.77	22.32	3.04	0.66	0.35	69.39
St. Louis	0231	Chrysler Corp-North Plant	65.23	1.69	61.69	8.54	5.53	0.47	468.58
St. Louis	0238	St Louis Lithographing Company-Heege Avenue							17.91
St. Louis	0242	Multiplex Display Fixture-Fenton	0.49		0.59	0.04	0.04	0.00	1.11
St. Louis	0275	Bussen Quarries Inc-Bussen Road				15.44	0.51		
St. Louis	0276	Ruprecht Quarry-Paule Rd				0.04			
St. Louis	0281	BFI Missouri Pass Landfill-Maryland Heights	30.58		9.17	5.30	0.65	2.92	5.25
St. Louis	0282	Color Art Inc-Crestwood	1.01	0.04	1.20	0.09	0.02	0.01	24.04
St. Louis	0308	Fred Weber Inc Sanitary Landfill-St Louis County	130.13		6.94	6.83	3.30	2.43	8.12
St. Louis	0310	Onyx Oak Ridge Landfill Inc-(West County)	44.89		2.39	2.23	1.14	0.84	4.14
St. Louis	0312	Bridgeton Landfill Authority-Bridgeton	244.28		13.03	5.54	5.54	4.56	8.42
St. Louis	0315	Flex-O-Lite Inc-Fenton	-		-	-		-	24.34
St. Louis	0317	Pro-Tect Mfg Inc-Ferguson Ave							19.25

County	Site ID	Facility Name	CO	NH_3	NO_X	PM_{10}-PRI	$PM_{2.5}$-PRI	SO_2	VOC
St. Louis	0318	St Marys Health Center-Richmond Heights	6.74	0.05	8.23	0.62	0.15	0.15	0.49
St. Louis	0327	Camie-Campbell Inc-Watson Industrial Park							5.13
St. Louis	1012	Belt Service Corp-Earth City	0.47	0.02	0.56	1.00	0.01	0.00	42.47
St. Louis	1015	Kv Pharmaceutical Company-Brentwood	-	-	-	0.11	0.11	-	58.93
St. Louis	1029	Depaul Health Center-Bridgeton	6.05	0.04	7.20	0.55	0.55	0.04	0.40
St. Louis	1047	Kv Pharmaceutical Company-Schuetz Rd	1.22	0.05	1.45	0.77	0.77	0.01	6.40
St. Louis	1052	Veterans Admin Medical Center-Jefferson Barracks Drive	-	-	-	1.22	-	-	0.89
St. Louis	1097	Reichhold Chemicals Inc-Valley Park	4.40	0.17	5.24	1.22	0.18	0.03	33.03
St. Louis	1101	St Luke'S Hospital-Woods Mill Road	5.24	0.04	6.34	0.13	0.13	0.58	0.34
St. Louis	1156	St Joseph Hospital-Kirkwood	2.99	0.02	3.56	8.15	0.07	0.06	2.25
St. Louis	1192	Pan-Glo St Louis-Trenton Avenue							4.82
St. Louis	1204	Whitmire Microgen Research Laboratory-Kirkwood							5.91
St. Louis	1205	Metropolitan St Louis Sewer District-Mo River Wasterwater Treatment Plant	7.10	101.19	91.27	0.27	0.27	1.41	11.15
St. Louis	1210	Metropolitan St Louis Sewer District-Coldwater Creek Sewage Treatment Plant	50.69	105.85	69.15	0.38	0.38	2.02	3.32
St. Louis	1226	Simpson Construction Materials Llc-Valley Park	20.28		6.05	22.57	0.66	4.44	1.56
St. Louis	1248	Fred Weber Inc-South Asphalt	24.49		3.98	2.04	0.01	0.28	0.52
St. Louis	1249	Fred Weber Inc-North Asphalt H & B	37.15		9.19	2.79	0.62	0.88	1.64

County	Site ID	Facility Name	CO	NH_3	NO_X	PM_{10}-PRI	$PM_{2.5}$-PRI	SO_2	VOC
St. Louis	1250	Fred Weber Inc-North Asphalt B & G	37.42		2.34	0.44		0.43	0.77
St. Louis	1489	Gkn Aerospace Services Inc-Berkeley	11.36	0.44	7.23	13.41	13.36	0.17	51.28
St. Louis	1520	F & S Real Eastate Inc-St Louis							61.13
St. Louis	1538	KV PHARMACEUTICAL-BRIDGETON	-	-	-	0.00	0.00	-	18.49
St. Louis City	0003	Anheuser-Busch Inc-St Louis	145.98	24.25	668.29	346.31	24.38	5,431.34	250.30
St. Louis City	0017	Mallinckrodt Inc	77.49	4.13	107.11	24.75	23.96	273.50	43.76
St. Louis City	0027	Precoat Metals	5.10		6.07	0.46		0.04	29.21
St. Louis City	0031	ADM Gromark River Systems-St Louis	0.00		0.00	5.93	0.90	-	-
St. Louis City	0038	Trigen-St Louis Energy Corp-Ashley Street Station	46.27	2.13	37.02	5.60	5.60	1.18	3.32
St. Louis City	0040	Washington Univ Medical School-Boiler Plant	28.23	0.18	38.06	27.61	2.86	1.58	2.00
St. Louis City	0047	Fred Weber Inc-Asphalt Plant	9.56	0.00	1.75	1.29		0.11	0.22
St. Louis City	0053	Metropolitan St Louis Sewer District-Bissel Plant	552.29	534.96	89.34	22.95	3.62	10.93	43.21
St. Louis City	0057	Procter & Gamble-Procter & Gamble	9.89	0.38	11.91	47.36	47.35	0.73	0.65
St. Louis City	0063	Dial Corp-Dial Corp	8.39		9.99	24.48	24.47	0.06	1.95
St. Louis City	0066	Elementis Specialties Inc	6.78	0.26	8.07	12.24	0.38	0.05	56.32
St. Louis City	0070	Astaris Llc-Carondelet Plant	27.07	0.55	8.36	15.45	1.31	0.33	1.31
St. Louis City	0096	P D George Co (The)	3.73	0.30	4.66	1.43	1.43	0.03	38.27
St. Louis City	0097	U S Paint Div Of Grow Group-U S Paint Div Of Grow Group				3.72			33.00

County	Site ID	Facility Name	CO	NH_3	NO_X	PM_{10}-PRI	$PM_{2.5}$-PRI	SO_2	VOC
St. Louis City	0118	Alumax Foils Inc-Alcoa Foil Products/Alumax Foils Inc	14.02	0.01	22.94	47.31	46.99	0.68	488.67
St. Louis City	0159	ADM/TPC Milling Co-Pillsbury Company	-	-	-	22.61	15.60	-	6.96
St. Louis City	0161	Poly One Corporation-St Louis							3.34
St. Louis City	0162	Marquette Tool & Die							7.40
St. Louis City	0175	St Louis Metallizing-St Louis	0.08		0.33	0.34		0.00	4.38
St. Louis City	0179	Italgrani Elevator	3.22	0.12	3.84	24.86	0.93	0.02	0.62
St. Louis City	0200	St Alexius Hospital-St Louis	0.33		1.33	0.03	-	0.01	0.03
St. Louis City	0204	Bjc Health System-Pavillion	1.51		6.56	0.33		0.40	0.32
St. Louis City	0269	Sensient Colors Inc-Baldwin Plant	2.41	0.09	2.90	0.48	0.23	0.09	0.20
St. Louis City	0391	Hermann Oak Leather Co	-		-	-		-	6.70
St. Louis City	0468	Lange-Stegmann Co	0.00		0.00	6.84		-	0.00
St. Louis City	0697	Sigma - Aldrich Co	3.14		2.91	0.28		0.02	4.05
St. Louis City	0808	Chemisphere Corporation-Chemisphere							3.20
St. Louis City	0809	PQ Corporation (The)-St Louis	9.65	0.53	113.75	66.57	66.57	0.18	5.19
St. Louis City	0938	Interstate Brands Corp-Interstate Brands Corp	1.27	0.05	2.12	0.11	0.11	0.01	43.55
St. Louis City	1055	Goodwin Printing Co -St Louis							8.86
St. Louis City	1077	Mid-West Industrial Chemical	-		-	0.61	-	-	6.24
St. Louis City	1093	Brenntag Mid-South Inc	0.00		0.00	0.00		-	0.22

County	Site ID	Facility Name	CO	NH_3	NO_X	PM_{10}-PRI	$PM_{2.5}$-PRI	SO_2	VOC
St. Louis City	1123	U S Ringbinder Corp-Loose Leaf Metals				-			2.99
St. Louis City	1280	St Louis Post Dispatch	0.44	0.00	0.53	0.04	0.01	0.00	1.92
St. Louis City	1370	National Geospatial-Intelligence Agency	1.38	0.05	1.92	0.13	0.13	0.03	0.11
St. Louis City	1396	Sigma - Aldrich Co-Sigma Chemical Company	4.92		5.86	0.45		0.04	9.47
St. Louis City	1407	Southern Metal Processing	2.17		6.93	0.45	0.45	6.49	1.26
St. Louis City	1423	Ashland Distribution Company-St Louis Plant				0.86			8.44
St. Louis City	1460	Allied Health Care Products	-		-	-	-	-	3.63
St. Louis City	1505	Energy Center (The)-St Louis Univ Health Sciences Center	9.43		11.64	0.37	0.39	0.92	0.70
St. Louis City	1519	Permacel St Louis Inc-Permacel St Louis Inc	2.30	0.03	1.73	0.16	0.08	0.01	0.75
St. Louis City	1556	Connector Castings	0.00	0.01	0.12	3.48	0.58	0.01	0.91
St. Louis City	1642	J S Alberici Construction	-		-	0.59		-	24.79
St. Louis City	2300	Superior Solvent & Chemical-St Louis							2.94
St. Louis City	2378	Laclede Tower Associates Llc-Laclede Gas Building	320.75	0.00	207.44	2.94	0.87	0.05	2.71
St. Louis City	2433	New World Pasta- Marceau Facility-New World Pasta	4.59	0.17	5.46	0.98	0.98	0.03	0.30
St. Louis City	2545	Southwestern Bell Telephone Company	6.68	0.11	14.06	0.57	0.50	0.72	0.60
St. Louis City	2711	St Louis University-Facilities Svcs	9.70	0.06	11.55	0.88	0.88	0.07	0.64
St. Louis City	2833	WASHINGTON UNIVERSITY-HILLTOP CAMPUS	1.06	0.01	1.26	0.10	0.10	0.01	0.07
St. Louis Nonattainment Area Missouri County Total			11,395.71	1,308.64	31,103.26	6,473.54	3,493.39	201,700.73	5,067.89

3.1.4 Point Source Emission Summary

Point source emissions for the five-county Missouri portion of the St. Louis Nonattainment Area are summarized in Table 5. Point source emissions for the entire state of Missouri are summarized by category nd by county in Table 7. Appendix E-1 is a listing of statewide point source emissions by facility.

Table 5 STLNA Point Source Emissions by County (tons per year)

County	CO	NH_3	NO_X	PM_{10}-PRI	PM_{25}-PRI	SO_2	VOC
Franklin	2,496.24	2.82	9,178.19	2,380.91	1,448.96	57,944.69	685.48
Jefferson	1,683.83	8.97	7,016.40	1,968.50	945.65	68,569.22	600.04
St. Charles	900.69	8.04	7,649.32	377.96	316.21	48,595.24	936.97
St. Louis	4,995.08	720.41	5,843.53	1,024.22	510.91	20,861.90	1,689.72
St. Louis City	1,319.86	568.40	1,415.83	721.95	271.66	5,729.67	1,155.67
Total	11,395.71	1,308.64	31,103.26	6,473.54	3,493.39	201,700.73	5,067.89

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Table 6 Statewide Point Source Emissions by Category (tons per year)

Description	*Number of Facilities*	*CO*	*NH_3*	*NO_x*	*PM_{10}*	*$PM_{2.5}$*	*SO_x*	*VOC*
Fossil Fuel Electric Power Generation	76	22,142	196	94,298	10,287	6,351	285,688	1,628
Primary Smelting and Refining of Nonferrous Metal (except Copper and Aluminum)	2	23	0	12	92	50	35,998	2
Cement Manufacturing	6	11,122	31	13,009	1,712	673	11,029	878
Steam and Air-Conditioning Supply	3	94	7	1,208	352	343	6,296	8
Petrochemical Manufacturing	2	121	16	946	149	20	5,586	174
Primary Aluminum Production	1	24,771	1	36	568	257	4,688	239
Pesticide and Other Agricultural Chemical Manufacturing	5	173	1	601	182	144	2,438	100
Lime Manufacturing	2	11,843	0	5,159	1,065	62	4,433	43
Pipeline Transportation of Natural Gas	10	1,350	2	8,551	115	115	2	328
Sewage Treatment Facilities	4	931	1,247	302	28	6	16	76

Nitrogenous Fertilizer Manufacturing	1		25	929	101	57		
Breweries	1	146	24	668	346	24	5,431	250
Secondary Smelting, Refining, and Alloying of Nonferrous Metal (except Copper and Aluminum)	1	13,391		64	27	19	2,519	2
Lead Ore and Zinc Ore Mining	2	0		0	92	4	0	4
Medicinal and Botanical Manufacturing	2	3	0	14	9	2	0	51
Automobile Manufacturing	2	159	3	342	72	42	448	1,851
Soybean Processing	4	34	0	40	145	71	0	1,009
Motor Vehicle Body Manufacturing	9	16	0	22	14	6	0	541
All Other Categories	435	5,959	102	3,757	2,976	750	2,798	10,225
Statewide Total	**568**	**92,278**	**1,655**	**129,958**	**18,334**	**8,997**	**367,370**	**17,410**

Table 7 Statewide Point Emissions by County (tons per year)

State County FIPS Code	County Name	CO	NO_X	PM_{10}-PRI	$PM_{2.5}$-PRI	SO_2	VOC
29001	Adair	0.05	0.19	0.01		0.00	0.01
29003	Andrew	8.66	0.54	2.60	0.12	0.10	0.18
29007	Audrain	237.83	96.24	106.70	44.82	19.94	398.65
29009	Barry	31.17	59.74	43.05	5.85	15.84	527.72
29011	Barton	125.64	8.67	14.53	4.00	2.34	4.39
29013	Bates	1.58	8.06	5.79	0.73	0.77	0.59
29017	Bollinger	161.20	2,497.11	27.19	27.15	0.33	67.43
29019	Boone	1,143.44	3,153.74	170.02	143.53	9,966.06	157.51
29021	Buchanan	220.11	3,251.50	257.36	39.69	3,704.35	746.92
29023	Butler	220.70	154.10	24.69	4.08	4.86	145.81
29025	Caldwell			1.00	0.15		-
29027	Callaway	51.94	53.40	38.24	19.27	42.87	63.95
29029	Camden	1.61	2.80	0.24		0.00	13.08
29031	Cape Girardeau	8,724.64	1,398.71	644.97	188.48	450.57	367.56
29033	Carroll	4.10	5.23	15.14	1.08	0.18	87.16
29037	Cass	109.64	162.26	70.33	20.95	5.25	6.59
29039	Cedar	8.20	6.55	33.75	33.42	0.06	0.54
29041	Chariton						5.13
29047	Clay	105.47	649.95	405.54	202.44	2,676.97	1,508.81
29049	Clinton	-	-	0.21	0.02	-	1.68
29051	Cole	112.87	39.22	11.84	8.10	9.33	202.83
29053	Cooper	75.60	29.94	24.85	2.81	4.05	63.11
29055	Crawford						36.04
29061	Daviess	1.34	6.21	0.83	0.49	0.41	1.17
29063	DeKalb	3.86	9.26	0.36	-	-	1.30
29065	Dent	38.34	32.20	42.05	17.58	1.59	5.00
29069	Dunklin	32.55	55.87	86.34	2.32	1.82	5.95
29071	Franklin	2,496.24	9,178.19	2,380.91	1,448.96	57,944.69	685.48
29073	Gasconade	1.58	1.88	0.14	0.14	0.01	145.12
29075	Gentry	-	-	-		-	-
29077	Greene	1,828.54	4,904.76	987.01	140.69	8,682.05	364.20
29079	Grundy	3.69	5.39	2.81	0.40	0.44	51.82
29081	Harrison	19.60	47.03	1.83	-	-	3.47

State County FIPS Code	County Name	CO	NO_X	PM_{10}-PRI	$PM_{2.5}$-PRI	SO_2	VOC
29083	Henry	519.94	6,420.34	453.66	245.94	12,123.91	242.39
29087	Holt	7.54	16.84	65.01	23.65	117.57	154.17
29091	Howell	1,034.81	87.42	61.77	6.06	3.18	485.66
29093	Iron	13,390.58	63.64	172.00	59.98	2,518.78	3.87
29095	Jackson	4,257.40	13,339.46	1,793.34	1,124.98	28,174.46	930.77
29097	Jasper	980.35	5,127.28	602.59	529.85	10,827.85	571.27
29099	Jefferson	1,683.83	7,016.40	1,968.50	945.65	68,569.22	600.04
29101	Johnson	81.04	66.12	15.75	3.66	7.96	70.63
29105	Laclede	38.55	37.29	42.28	6.69	1.63	173.10
29107	Lafayette	7.84	8.23	8.15	1.60	0.08	88.97
29109	Lawrence	21.75	13.40	4.60	0.10	0.03	122.77
29111	Lewis						44.80
29113	Lincoln	6.22	39.91	31.62	5.40	0.29	80.39
29115	Linn	0.04	0.21	0.01	0.02	0.00	55.68
29117	Livingston	1.38	3.21	0.73	0.13	0.05	2.90
29119	McDonald	52.65	38.65	25.63	23.93	0.38	3.45
29121	Macon	120.37	55.20	32.73	4.26	1.38	61.11
29123	Madison	194.01	324.94	0.96	0.96	0.03	74.93
29125	Maries	22.89	112.17	100.19		15.75	54.77
29127	Marion	150.36	555.05	175.05	142.19	2,437.52	40.73
29131	Miller	0.05	0.08	0.13	0.13	0.00	25.23
29133	Mississippi	0.92	1.10	4.86	0.28	0.01	0.22
29137	Monroe	0.04	0.18	0.01		0.01	0.01
29139	Montgomery	82.34	170.16	48.72	25.04	578.44	0.00
29143	New Madrid	25,872.19	11,835.86	1,160.17	606.03	19,674.94	556.53
29145	Newton	43.28	83.65	2.61	1.29	0.97	62.07
29147	Nodaway	380.16	1,037.33	31.95	26.28	1.32	220.23
29151	Osage	78.95	2,409.99	267.27	247.69	5,038.05	55.48
29155	Pemiscot	4.25	7.42	40.13	1.19	0.04	126.81
29157	Perry	5.39	10.00	30.33	0.73	25.80	430.82
29159	Pettis	418.53	2,067.85	103.51	41.82	153.30	298.26

State County FIPS Code	County Name	CO	NO_X	PM_{10}-PRI	$PM_{2.5}$-PRI	SO_2	VOC
29161	Phelps	23.80	44.26	7.90	0.50	460.68	50.86
29163	Pike	1,792.34	7,244.57	458.49	287.55	13,422.43	686.71
29165	Platte	652.80	6,982.63	537.34	297.31	15,077.12	233.79
29167	Polk	-	-	0.21	-	-	36.65
29169	Pulaski	9.45	40.45	3.06	0.76	29.79	21.70
29171	Putnam	0.01	1.50	0.02	0.02	0.26	0.20
29173	Ralls	84.78	2,413.44	185.71	32.25	135.46	34.36
29175	Randolph	4,493.43	12,126.80	447.08	439.61	15,102.36	203.60
29179	Reynolds	-	-	25.44	1.61	-	2.00
29183	St. Charles	900.69	7,649.32	377.96	316.21	48,595.24	936.97
29186	Ste. Genevieve	11,853.64	5,246.81	1,080.87	63.58	4,432.97	59.96
29187	St. Francois	45.81	403.95	169.42	27.36	25.71	46.73
29189	St. Louis	4,995.08	5,843.53	1,024.22	510.91	20,861.90	1,689.72
29195	Saline	114.08	659.55	207.52	157.89	3,147.31	37.33
29201	Scott	375.52	2,921.37	170.64	120.58	6,530.38	90.68
29203	Shannon	19.55	15.96	3.66	0.58	0.81	0.55
29205	Shelby	82.31	2.69	0.15	0.00	0.02	23.59
29207	Stoddard	118.32	77.18	126.05	22.84	1.78	262.64
29209	Stone			10.84			
29213	Taney	29.80	25.69	24.97	6.88	7.34	10.21
29215	Texas	17.62	10.25	2.73		0.05	36.76
29217	Vernon	31.19	39.12	5.94	2.81	0.23	279.89
29219	Warren	6.68	10.24	47.20	0.86	0.06	171.17
29221	Washington	4.55	5.42	5.03	0.72	0.03	18.31
29225	Webster	0.31	0.80	0.88	0.07	0.00	7.04
29229	Wright	39.63	3.04	28.61	2.11	0.67	28.11
29510	St. Louis city	1,319.86	1,415.83	721.95	271.66	5,729.67	1,155.67
Missouri Total		92,239.10	129,952.55	18,318.48	8,997.41	367,370.10	17,432.49

3.2 Nonpoint Source Emissions

3.2.1 Procedures and Methodologies

The nonpoint (also known as area) source categories with published methods of estimation are too numerous to calculate county-level inventories given current resources. The EPA, in conjunction with the Eastern Region Technical Advisory Committee (ERTAC), will complete inventory documentation and calculation for most nonpoint source categories using national defaults. Several categories are then improved with state-level information or with point-source subtraction.

Missouri prepared inventories for 18 categories that required point source subtraction or state-specific data. These categories are listed in the Missouri Category Summary section below. Documentation of the calculation methodology and data sources is included in Table 9. Categories that did not require point source subtraction that were calculated by EPA are listed in the EPA Category Summary section.

3.2.2 List of Source Categories and Emissions

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Table 8 STLNA Nonpoint Emission Records (tons per year)

County Name	Source Classification Code	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four	NOX	PM10-PRI	PM25-PRI	SO2	VOC
Franklin	2102001000	Stationary Source Fuel Combustion	Anthracite Coal	Industrial	Total: All Boiler Types	-	-		-	-
Franklin	2102002000	Stationary Source Fuel Combustion	Bituminous/Subbituminous Coal	Industrial	Total: All Boiler Types	137.70	150.22		903.83	0.63
Franklin	2102004000	Stationary Source Fuel Combustion	Distillate Oil	Industrial	Total: Boilers and IC Engines	1.10	0.13		2.34	0.01
Franklin	2102005000	Stationary Source Fuel Combustion	Residual Oil	Industrial	Total: All Boiler Types	0.96	0.39		6.13	0.00
Franklin	2102006000	Stationary Source Fuel Combustion	Natural Gas	Industrial	Total: Boilers and IC Engines	0.75	0.00		0.00	0.04
Franklin	2102007000	Stationary Source Fuel Combustion	Liquified Petroleum Gas (LPG)	Industrial	Total: All Boiler Types	-	-		-	-
Franklin	2102008000	Stationary Source Fuel Combustion	Wood	Industrial	Total: All Boiler Types	11.90	27.06		1.35	0.92
Franklin	2102011000	Stationary Source Fuel Combustion	Kerosene	Industrial	Total: All Boiler Types	-	-		-	-
Franklin	2103001000	Stationary Source Fuel Combustion	Anthracite Coal	Commercial/Institutional	Total: All Boiler Types	-	-		-	-
Franklin	2103002000	Stationary Source Fuel Combustion	Bituminous/Subbituminous Coal	Commercial/Institutional	Total: All Boiler Types	5.47	5.97		34.96	0.02
Franklin	2103004000	Stationary Source Fuel Combustion	Distillate Oil	Commercial/Institutional	Total: Boilers and IC Engines	0.07	0.00		0.15	0.00
Franklin	2103005000	Stationary Source Fuel Combustion	Residual Oil	Commercial/Institutional	Total: All Boiler Types	0.05	0.01		0.35	0.00
Franklin	2103006000	Stationary Source Fuel Combustion	Natural Gas	Commercial/Institutional	Total: Boilers and IC Engines	13.33	0.02		0.08	0.73
Franklin	2103007000	Stationary Source Fuel Combustion	Liquified Petroleum Gas (LPG)	Commercial/Institutional	Total: All Combustor Types	0.58	0.00		0.00	0.03
Franklin	2103008000	Stationary Source Fuel Combustion	Wood	Commercial/Institutional	Total: All Boiler Types	0.98	2.22		0.11	0.08
Franklin	2103011000	Stationary Source Fuel Combustion	Kerosene	Commercial/Institutional	Total: All Combustor Types	0.03	-		0.08	-
Franklin	2104002000	Stationary Source Fuel Combustion	Bituminous/Subbituminous Coal	Residential	Total: All Combustor Types	-	-		-	-
Franklin	2104004000	Stationary Source Fuel Combustion	Distillate Oil	Residential	Total: All Combustor Types	10.38	0.62		24.56	0.40
Franklin	2104006000	Stationary Source Fuel Combustion	Natural Gas	Residential	Total: All Combustor Types	13.96	0.03		0.09	0.82
Franklin	2104007000	Stationary Source Fuel Combustion	Liquified Petroleum Gas (LPG)	Residential	Total: All Combustor Types	29.11	0.04		0.12	1.13
Franklin	2104008100	Stationary Source Fuel Combustion	Wood	Residential	Fireplace: general	2.19	19.88	19.88	0.34	15.92
Franklin	2104008210	Stationary Source Fuel Combustion	Wood	Residential	Woodstove: fireplace inserts; non-EPA certified	2.28	24.95	24.95	0.33	43.21
Franklin	2104008220	Stationary Source Fuel Combustion	Wood	Residential	Woodstove: fireplace inserts; EPA certified; non-catalytic	0.60	5.13	5.13	0.10	3.14

County Name	Source Classification Code	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four	NOX	PM10-PRI	PM25-PRI	SO2	VOC
Franklin	2104008230	Stationary Source Fuel Combustion	Wood	Residential	Woodstove: fireplace inserts; EPA certified; catalytic	0.17	1.78	1.78	0.03	1.31
Franklin	2104008310	Stationary Source Fuel Combustion	Wood	Residential	Woodstove: freestanding, non-EPA certified	2.07	22.58	22.58	0.30	39.12
Franklin	2104008320	Stationary Source Fuel Combustion	Wood	Residential	Woodstove: freestanding, EPA certified, non-catalytic	0.54	4.63	4.63	0.09	2.84
Franklin	2104008330	Stationary Source Fuel Combustion	Wood	Residential	Woodstove: freestanding, EPA certified, catalytic	0.16	1.60	1.60	0.03	1.18
Franklin	2104008400	Stationary Source Fuel Combustion	Wood	Residential	Woodstove: pellet-fired, general (freestanding or FP insert)	0.89	0.72	0.72	0.07	0.01
Franklin	2104008510	Stationary Source Fuel Combustion	Wood	Residential	Furnace: Indoor, cordwood-fired, non-EPA certified	0.39	5.81	5.81	0.43	2.48
Franklin	2104008610	Stationary Source Fuel Combustion	Wood	Residential	Hydronic heater: outdoor	0.74	11.09	11.09	0.82	4.74
Franklin	2104009000	Stationary Source Fuel Combustion	Firelog	Residential	Total: All Combustor Types	0.86	3.29	3.19		4.44
Franklin	2104011000	Stationary Source Fuel Combustion	Kerosene	Residential	Total: All Heater Types	4.41	0.26		10.43	0.17
Franklin	2294000000	Mobile Sources	All Paved Roads	Paved Roads	Total: Fugitives		1,329.55	83.84		
Franklin	2296000000	Mobile Sources	All Unpaved Roads	Unpaved Roads	Total: Fugitives		15,606.80	1,555.69		
Franklin	2302002100	Industrial Processes	Commercial Cooking - Charbroiling	Food and Kindred Products: SIC 20	Conveyorized Charbroiling		2.51	2.44		0.61
Franklin	2302002200	Industrial Processes	Commercial Cooking - Charbroiling	Food and Kindred Products: SIC 20	Under-fired Charbroiling		17.80	17.23		2.09
Franklin	2302003000	Industrial Processes	Commercial Cooking - Frying	Food and Kindred Products: SIC 20	Deep Fat Fying		-			0.64
Franklin	2302003100	Industrial Processes	Commercial Cooking - Frying	Food and Kindred Products: SIC 20	Flat Griddle Frying		5.20	3.95		0.30
Franklin	2302003200	Industrial Processes	Commercial Cooking - Frying	Food and Kindred Products: SIC 20	Clamshell Griddle Frying		0.35	0.30		0.01
Franklin	2311010000	Industrial Processes	Residential	Construction: SIC 15 - 17	Total		23.72	2.37		
Franklin	2311020000	Industrial Processes	Industrial/Commercial/Institutional	Construction: SIC 15 - 17	Total		261.42	26.14		
Franklin	2311030000	Industrial Processes	Road Construction	Construction: SIC 15 - 17	Total		166.62	16.66		
Franklin	2401001000	Solvent Utilization	Architectural Coatings	Surface Coating	Total: All Solvent Types					152.36
Franklin	2401005000	Solvent Utilization	Auto Refinishing: SIC 7532	Surface Coating	Total: All Solvent Types					26.30
Franklin	2401008000	Solvent Utilization	Traffic Markings	Surface Coating	Total: All Solvent Types					16.84

County Name	Source Classification Code	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four	NOX	PM10-PRI	PM25-PRI	SO2	VOC
Franklin	2401015000	Solvent Utilization	Factory Finished Wood: SIC 2426 thru 242	Surface Coating	Total: All Solvent Types					1.10
Franklin	2401020000	Solvent Utilization	Wood Furniture: SIC 25	Surface Coating	Total: All Solvent Types					25.87
Franklin	2401025000	Solvent Utilization	Metal Furniture: SIC 25	Surface Coating	Total: All Solvent Types					26.48
Franklin	2401030000	Solvent Utilization	Paper: SIC 26	Surface Coating	Total: All Solvent Types					-
Franklin	2401040000	Solvent Utilization	Metal Cans: SIC 341	Surface Coating	Total: All Solvent Types					-
Franklin	2401050000	Solvent Utilization	Miscellaneous Finished Metals: SIC 34 - (341 + 3498)	Surface Coating	Total: All Solvent Types					64.93
Franklin	2401055000	Solvent Utilization	Machinery and Equipment: SIC 35	Surface Coating	Total: All Solvent Types					45.08
Franklin	2401060000	Solvent Utilization	Large Appliances: SIC 363	Surface Coating	Total: All Solvent Types					-
Franklin	2401065000	Solvent Utilization	Electronic and Other Electrical: SIC 36 - 363	Surface Coating	Total: All Solvent Types					4.92
Franklin	2401070000	Solvent Utilization	Motor Vehicles: SIC 371	Surface Coating	Total: All Solvent Types					17.90
Franklin	2401075000	Solvent Utilization	Aircraft: SIC 372	Surface Coating	Total: All Solvent Types					1.93
Franklin	2401080000	Solvent Utilization	Marine: SIC 373	Surface Coating	Total: All Solvent Types					14.29
Franklin	2401085000	Solvent Utilization	Railroad: SIC 374	Surface Coating	Total: All Solvent Types					-
Franklin	2401090000	Solvent Utilization	Miscellaneous Manufacturing	Surface Coating	Total: All Solvent Types					40.46
Franklin	2401100000	Solvent Utilization	Industrial Maintenance Coatings	Surface Coating	Total: All Solvent Types					55.49
Franklin	2401200000	Solvent Utilization	Other Special Purpose Coatings	Surface Coating	Total: All Solvent Types					0.35
Franklin	2415000000	Solvent Utilization	All Processes/All Industries	Degreasing	Total: All Solvent Types					92.82
Franklin	2420000000	Solvent Utilization	All Processes	Dry Cleaning	Total: All Solvent Types					1.46
Franklin	2425000000	Solvent Utilization	All Processes	Graphic Arts	Total: All Solvent Types					75.43
Franklin	2460100000	Solvent Utilization	All Personal Care Products	Miscellaneous Non-industrial: Consumer and Commercial	Total: All Solvent Types					95.85
Franklin	2460200000	Solvent Utilization	All Household Products	Miscellaneous Non-industrial: Consumer and Commercial	Total: All Solvent Types					90.81
Franklin	2460400000	Solvent Utilization	All Automotive Aftermarket Products	Miscellaneous Non-industrial: Consumer and Commercial	Total: All Solvent Types					68.61

County Name	Source Classification Code	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four	NOX	PM10-PRI	PM25-PRI	SO2	VOC
Franklin	2460500000	Solvent Utilization	All Coatings and Related Products	Miscellaneous Non-industrial: Consumer and Commercial	Total: All Solvent Types					47.93
Franklin	2460600000	Solvent Utilization	All Adhesives and Sealants	Miscellaneous Non-industrial: Consumer and Commercial	Total: All Solvent Types					28.76
Franklin	2460800000	Solvent Utilization	All FIFRA Related Products	Miscellaneous Non-industrial: Consumer and Commercial	Total: All Solvent Types					89.80
Franklin	2460900000	Solvent Utilization	Miscellaneous Products (Not Otherwise Covered)	Miscellaneous Non-industrial: Consumer and Commercial	Total: All Solvent Types					3.53
Franklin	2461021000	Solvent Utilization	Cutback Asphalt	Miscellaneous Non-industrial: Commercial	Total: All Solvent Types					36.99
Franklin	2461022000	Solvent Utilization	Emulsified Asphalt	Miscellaneous Non-industrial: Commercial	Total: All Solvent Types					19.34
Franklin	2501011011	Storage and Transport	Residential Portable Gas Cans	Petroleum and Petroleum Product Storage	Permeation					15.22
Franklin	2501011012	Storage and Transport	Residential Portable Gas Cans	Petroleum and Petroleum Product Storage	Evaporation (includes Diurnal losses)					29.72
Franklin	2501011013	Storage and Transport	Residential Portable Gas Cans	Petroleum and Petroleum Product Storage	Spillage During Transport					3.46
Franklin	2501011014	Storage and Transport	Residential Portable Gas Cans	Petroleum and Petroleum Product Storage	Refilling at the Pump - Vapor Displacement					1.14
Franklin	2501011015	Storage and Transport	Residential Portable Gas Cans	Petroleum and Petroleum Product Storage	Refilling at the Pump - Spillage					0.10
Franklin	2501012011	Storage and Transport	Commercial Portable Gas Cans	Petroleum and Petroleum Product Storage	Permeation					0.49
Franklin	2501012012	Storage and Transport	Commercial Portable Gas Cans	Petroleum and Petroleum Product Storage	Evaporation (includes Diurnal losses)					0.95
Franklin	2501012013	Storage and Transport	Commercial Portable Gas Cans	Petroleum and Petroleum Product Storage	Spillage During Transport					4.72
Franklin	2501012014	Storage and Transport	Commercial Portable Gas Cans	Petroleum and Petroleum Product Storage	Refilling at the Pump - Vapor Displacement					2.19
Franklin	2501012015	Storage and Transport	Commercial Portable Gas Cans	Petroleum and Petroleum Product Storage	Refilling at the Pump - Spillage					0.18

County Name	Source Classification Code	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four	NOX	PM10-PRI	PM25-PRI	SO2	VOC
Franklin	2501050120	Storage and Transport	Bulk Terminals: All Evaporative Losses	Petroleum and Petroleum Product Storage	Gasoline					7.02
Franklin	2501055120	Storage and Transport	Bulk Plants: All Evaporative Losses	Petroleum and Petroleum Product Storage	Gasoline					5.46
Franklin	2501060053	Storage and Transport	Gasoline Service Stations	Petroleum and Petroleum Product Storage	Stage 1: Balanced Submerged Filling					20.35
Franklin	2501060201	Storage and Transport	Gasoline Service Stations	Petroleum and Petroleum Product Storage	Underground Tank: Breathing and Emptying					28.78
Franklin	2501080050	Storage and Transport	Airports : Aviation Gasoline	Petroleum and Petroleum Product Storage	Stage 1: Total					11.52
Franklin	2501080100	Storage and Transport	Airports : Aviation Gasoline	Petroleum and Petroleum Product Storage	Stage 2: Total					0.60
Franklin	2505030120	Storage and Transport	Truck	Petroleum and Petroleum Product Transport	Gasoline					1.88
Franklin	2505040120	Storage and Transport	Pipeline	Petroleum and Petroleum Product Transport	Gasoline					5.97
Franklin	2610000100	Waste Disposal, Treatment, and Recovery	All Categories	Open Burning	Yard Waste - Leaf Species Unspecified	1.37	4.86	4.86	0.17	6.18
Franklin	2610000400	Waste Disposal, Treatment, and Recovery	All Categories	Open Burning	Yard Waste - Brush Species Unspecified	1.10	4.36	3.36	0.37	4.19
Franklin	2610000500	Waste Disposal, Treatment, and Recovery	All Categories	Open Burning	Land Clearing Debris (use 28-10-005-000 for Logging Debris Burning)	20.55	69.87	69.87		47.67
Franklin	2610030000	Waste Disposal, Treatment, and Recovery	Residential	Open Burning	Household Waste (use 26-10-000-xxx for Yard Wastes)	30.53	193.38	177.10	5.09	43.56
Franklin	2630020000	Waste Disposal, Treatment, and Recovery	Public Owned	Wastewater Treatment	Total Processed					1.91
Jefferson	2102001000	Stationary Source Fuel Combustion	Anthracite Coal	Industrial	Total: All Boiler Types	-	-		-	-
Jefferson	2102002000	Stationary Source Fuel Combustion	Bituminous/Subbituminous Coal	Industrial	Total: All Boiler Types	131.59	143.55		863.70	0.60
Jefferson	2102004000	Stationary Source Fuel Combustion	Distillate Oil	Industrial	Total: Boilers and IC Engines	1.05	0.05		2.24	0.01
Jefferson	2102005000	Stationary Source Fuel Combustion	Residual Oil	Industrial	Total: All Boiler Types	0.91	0.34		5.86	0.00
Jefferson	2102006000	Stationary Source Fuel Combustion	Natural Gas	Industrial	Total: Boilers and IC Engines	0.72	0.00		0.00	0.04
Jefferson	2102007000	Stationary Source Fuel Combustion	Liquified Petroleum Gas (LPG)	Industrial	Total: All Boiler Types	-	-		-	-
Jefferson	2102008000	Stationary Source Fuel Combustion	Wood	Industrial	Total: All Boiler Types	11.38	25.86		1.29	0.88

County Name	Source Classification Code	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four	NOX	PM10-PRI	PM25-PRI	SO2	VOC
Jefferson	2102011000	Stationary Source Fuel Combustion	Kerosene	Industrial	Total: All Boiler Types	-	-		-	-
Jefferson	2103001000	Stationary Source Fuel Combustion	Anthracite Coal	Commercial/Institutional	Total: All Boiler Types	-	-		-	-
Jefferson	2103002000	Stationary Source Fuel Combustion	Bituminous/Subbituminous Coal	Commercial/Institutional	Total: All Boiler Types	1.09	1.19		6.97	0.00
Jefferson	2103004000	Stationary Source Fuel Combustion	Distillate Oil	Commercial/Institutional	Total: Boilers and IC Engines	0.01	0.00		0.03	0.00
Jefferson	2103005000	Stationary Source Fuel Combustion	Residual Oil	Commercial/Institutional	Total: All Boiler Types	0.01	0.00		0.07	0.00
Jefferson	2103006000	Stationary Source Fuel Combustion	Natural Gas	Commercial/Institutional	Total: Boilers and IC Engines	2.66	0.00		0.02	0.15
Jefferson	2103007000	Stationary Source Fuel Combustion	Liquified Petroleum Gas (LPG)	Commercial/Institutional	Total: All Combustor Types	0.12	0.00		0.00	0.01
Jefferson	2103008000	Stationary Source Fuel Combustion	Wood	Commercial/Institutional	Total: All Boiler Types	0.19	0.44		0.02	0.02
Jefferson	2103011000	Stationary Source Fuel Combustion	Kerosene	Commercial/Institutional	Total: All Combustor Types	0.01	-		0.02	-
Jefferson	2104002000	Stationary Source Fuel Combustion	Bituminous/Subbituminous Coal	Residential	Total: All Combustor Types	-	-		-	-
Jefferson	2104004000	Stationary Source Fuel Combustion	Distillate Oil	Residential	Total: All Combustor Types	4.93	0.30		11.66	0.19
Jefferson	2104006000	Stationary Source Fuel Combustion	Natural Gas	Residential	Total: All Combustor Types	77.94	0.17		0.50	4.56
Jefferson	2104007000	Stationary Source Fuel Combustion	Liquified Petroleum Gas (LPG)	Residential	Total: All Combustor Types	40.01	0.06		0.17	1.56
Jefferson	2104008100	Stationary Source Fuel Combustion	Wood	Residential	Fireplace: general	4.64	42.15	42.15	0.71	33.76
Jefferson	2104008210	Stationary Source Fuel Combustion	Wood	Residential	Woodstove: fireplace inserts; non-EPA certified	4.85	52.95	52.95	0.69	91.72
Jefferson	2104008220	Stationary Source Fuel Combustion	Wood	Residential	Woodstove: fireplace inserts; EPA certified; non-catalytic	1.27	10.89	10.89	0.22	6.67
Jefferson	2104008230	Stationary Source Fuel Combustion	Wood	Residential	Woodstove: fireplace inserts; EPA certified; catalytic	0.37	3.78	3.78	0.07	2.78
Jefferson	2104008310	Stationary Source Fuel Combustion	Wood	Residential	Woodstove: freestanding, non-EPA certified	4.38	47.91	47.91	0.63	82.99
Jefferson	2104008320	Stationary Source Fuel Combustion	Wood	Residential	Woodstove: freestanding, EPA certified, non-catalytic	1.15	9.84	9.84	0.20	6.03
Jefferson	2104008330	Stationary Source Fuel Combustion	Wood	Residential	Woodstove: freestanding, EPA certified, catalytic	0.33	3.40	3.40	0.07	2.50
Jefferson	2104008400	Stationary Source Fuel Combustion	Wood	Residential	Woodstove: pellet-fired, general (freestanding or FP insert)	1.86	1.49	1.49	0.16	0.02

County Name	Source Classification Code	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four	NOX	PM10-PRI	PM25-PRI	SO2	VOC
Jefferson	2104008510	Stationary Source Fuel Combustion	Wood	Residential	Furnace: Indoor, cordwood-fired, non-EPA certified	0.82	12.31	12.31	0.91	5.26
Jefferson	2104008610	Stationary Source Fuel Combustion	Wood	Residential	Hydronic heater: outdoor	1.57	23.54	23.54	1.73	10.06
Jefferson	2104009000	Stationary Source Fuel Combustion	Firelog	Residential	Total: All Combustor Types	1.80	6.88	6.67		9.29
Jefferson	2104011000	Stationary Source Fuel Combustion	Kerosene	Residential	Total: All Heater Types	2.09	0.13		4.95	0.08
Jefferson	2294000000	Mobile Sources	All Paved Roads	Paved Roads	Total: Fugitives		2,392.55	148.22		
Jefferson	2296000000	Mobile Sources	All Unpaved Roads	Unpaved Roads	Total: Fugitives		24,926.70	2,484.70		
Jefferson	2302002100	Industrial Processes	Commercial Cooking - Charbroiling	Food and Kindred Products: SIC 20	Conveyorized Charbroiling		5.42	5.25		1.31
Jefferson	2302002200	Industrial Processes	Commercial Cooking - Charbroiling	Food and Kindred Products: SIC 20	Under-fired Charbroiling		38.39	37.17		4.51
Jefferson	2302003000	Industrial Processes	Commercial Cooking - Frying	Food and Kindred Products: SIC 20	Deep Fat Fying		-			1.37
Jefferson	2302003100	Industrial Processes	Commercial Cooking - Frying	Food and Kindred Products: SIC 20	Flat Griddle Frying		11.22	8.53		0.65
Jefferson	2302003200	Industrial Processes	Commercial Cooking - Frying	Food and Kindred Products: SIC 20	Clamshell Griddle Frying		0.76	0.64		0.03
Jefferson	2311010000	Industrial Processes	Residential	Construction: SIC 15 - 17	Total		68.24	6.82		
Jefferson	2311020000	Industrial Processes	Industrial/Commercial/Institutional	Construction: SIC 15 - 17	Total		567.46	56.75		
Jefferson	2311030000	Industrial Processes	Road Construction	Construction: SIC 15 - 17	Total		392.86	39.29		
Jefferson	2401001000	Solvent Utilization	Architectural Coatings	Surface Coating	Total: All Solvent Types					328.70
Jefferson	2401005000	Solvent Utilization	Auto Refinishing: SIC 7532	Surface Coating	Total: All Solvent Types					30.22
Jefferson	2401008000	Solvent Utilization	Traffic Markings	Surface Coating	Total: All Solvent Types					16.71
Jefferson	2401015000	Solvent Utilization	Factory Finished Wood: SIC 2426 thru 242	Surface Coating	Total: All Solvent Types					0.17
Jefferson	2401020000	Solvent Utilization	Wood Furniture: SIC 25	Surface Coating	Total: All Solvent Types					10.31
Jefferson	2401025000	Solvent Utilization	Metal Furniture: SIC 25	Surface Coating	Total: All Solvent Types					1.25
Jefferson	2401030000	Solvent Utilization	Paper: SIC 26	Surface Coating	Total: All Solvent Types					18.22
Jefferson	2401040000	Solvent Utilization	Metal Cans: SIC 341	Surface Coating	Total: All Solvent Types					186.11
Jefferson	2401050000	Solvent Utilization	Miscellaneous Finished Metals: SIC 34 - (341 + 3498)	Surface Coating	Total: All Solvent Types					17.57
Jefferson	2401055000	Solvent Utilization	Machinery and Equipment: SIC 35	Surface Coating	Total: All Solvent Types					11.18
Jefferson	2401060000	Solvent Utilization	Large Appliances: SIC 363	Surface Coating	Total: All Solvent Types					0.93

County Name	Source Classification Code	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four	NOX	PM10-PRI	PM25-PRI	SO2	VOC
Jefferson	2401065000	Solvent Utilization	Electronic and Other Electrical: SIC 36 - 363	Surface Coating	Total: All Solvent Types					-
Jefferson	2401070000	Solvent Utilization	Motor Vehicles: SIC 371	Surface Coating	Total: All Solvent Types					1.45
Jefferson	2401075000	Solvent Utilization	Aircraft: SIC 372	Surface Coating	Total: All Solvent Types					1.93
Jefferson	2401080000	Solvent Utilization	Marine: SIC 373	Surface Coating	Total: All Solvent Types					0.82
Jefferson	2401085000	Solvent Utilization	Railroad: SIC 374	Surface Coating	Total: All Solvent Types					-
Jefferson	2401090000	Solvent Utilization	Miscellaneous Manufacturing	Surface Coating	Total: All Solvent Types					12.24
Jefferson	2401100000	Solvent Utilization	Industrial Maintenance Coatings	Surface Coating	Total: All Solvent Types					119.72
Jefferson	2401200000	Solvent Utilization	Other Special Purpose Coatings	Surface Coating	Total: All Solvent Types					0.76
Jefferson	2415000000	Solvent Utilization	All Processes/All Industries	Degreasing	Total: All Solvent Types					50.67
Jefferson	2420000000	Solvent Utilization	All Processes	Dry Cleaning	Total: All Solvent Types					10.51
Jefferson	2425000000	Solvent Utilization	All Processes	Graphic Arts	Total: All Solvent Types					73.46
Jefferson	2460100000	Solvent Utilization	All Personal Care Products	Miscellaneous Non-industrial: Consumer and Commercial	Total: All Solvent Types					206.80
Jefferson	2460200000	Solvent Utilization	All Household Products	Miscellaneous Non-industrial: Consumer and Commercial	Total: All Solvent Types					195.91
Jefferson	2460400000	Solvent Utilization	All Automotive Aftermarket Products	Miscellaneous Non-industrial: Consumer and Commercial	Total: All Solvent Types					148.02
Jefferson	2460500000	Solvent Utilization	All Coatings and Related Products	Miscellaneous Non-industrial: Consumer and Commercial	Total: All Solvent Types					103.40
Jefferson	2460600000	Solvent Utilization	All Adhesives and Sealants	Miscellaneous Non-industrial: Consumer and Commercial	Total: All Solvent Types					62.04
Jefferson	2460800000	Solvent Utilization	All FIFRA Related Products	Miscellaneous Non-industrial: Consumer and Commercial	Total: All Solvent Types					193.73
Jefferson	2460900000	Solvent Utilization	Miscellaneous Products (Not Otherwise Covered)	Miscellaneous Non-industrial: Consumer and Commercial	Total: All Solvent Types					7.62
Jefferson	2461021000	Solvent Utilization	Cutback Asphalt	Miscellaneous Non-industrial: Commercial	Total: All Solvent Types					67.05

County Name	Source Classification Code	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four	NOX	PM10-PRI	PM25-PRI	SO2	VOC
Jefferson	2461022000	Solvent Utilization	Emulsified Asphalt	Miscellaneous Non-industrial: Commercial	Total: All Solvent Types					35.06
Jefferson	2501011011	Storage and Transport	Residential Portable Gas Cans	Petroleum and Petroleum Product Storage	Permeation					33.20
Jefferson	2501011012	Storage and Transport	Residential Portable Gas Cans	Petroleum and Petroleum Product Storage	Evaporation (includes Diurnal losses)					64.83
Jefferson	2501011013	Storage and Transport	Residential Portable Gas Cans	Petroleum and Petroleum Product Storage	Spillage During Transport					7.55
Jefferson	2501011014	Storage and Transport	Residential Portable Gas Cans	Petroleum and Petroleum Product Storage	Refilling at the Pump - Vapor Displacement					2.48
Jefferson	2501011015	Storage and Transport	Residential Portable Gas Cans	Petroleum and Petroleum Product Storage	Refilling at the Pump - Spillage					0.21
Jefferson	2501012011	Storage and Transport	Commercial Portable Gas Cans	Petroleum and Petroleum Product Storage	Permeation					1.06
Jefferson	2501012012	Storage and Transport	Commercial Portable Gas Cans	Petroleum and Petroleum Product Storage	Evaporation (includes Diurnal losses)					2.07
Jefferson	2501012013	Storage and Transport	Commercial Portable Gas Cans	Petroleum and Petroleum Product Storage	Spillage During Transport					10.29
Jefferson	2501012014	Storage and Transport	Commercial Portable Gas Cans	Petroleum and Petroleum Product Storage	Refilling at the Pump - Vapor Displacement					4.78
Jefferson	2501012015	Storage and Transport	Commercial Portable Gas Cans	Petroleum and Petroleum Product Storage	Refilling at the Pump - Spillage					0.40
Jefferson	2501050120	Storage and Transport	Bulk Terminals: All Evaporative Losses	Petroleum and Petroleum Product Storage	Gasoline					79.68
Jefferson	2501055120	Storage and Transport	Bulk Plants: All Evaporative Losses	Petroleum and Petroleum Product Storage	Gasoline					62.00
Jefferson	2501060052	Storage and Transport	Gasoline Service Stations	Petroleum and Petroleum Product Storage	Stage 1: Splash Filling					520.75
Jefferson	2501060201	Storage and Transport	Gasoline Service Stations	Petroleum and Petroleum Product Storage	Underground Tank: Breathing and Emptying					50.80
Jefferson	2501080050	Storage and Transport	Airports : Aviation Gasoline	Petroleum and Petroleum Product Storage	Stage 1: Total					1.57
Jefferson	2501080100	Storage and Transport	Airports : Aviation Gasoline	Petroleum and Petroleum Product Storage	Stage 2: Total					0.08
Jefferson	2505030120	Storage and Transport	Truck	Petroleum and Petroleum Product Transport	Gasoline					3.32

County Name	Source Classification Code	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four	NOX	PM10-PRI	PM25-PRI	SO2	VOC
Jefferson	2505040120	Storage and Transport	Pipeline	Petroleum and Petroleum Product Transport	Gasoline					67.69
Jefferson	2610000100	Waste Disposal, Treatment, and Recovery	All Categories	Open Burning	Yard Waste - Leaf Species Unspecified	1.76	6.25	6.25	0.22	7.96
Jefferson	2610000400	Waste Disposal, Treatment, and Recovery	All Categories	Open Burning	Yard Waste - Brush Species Unspecified	1.42	5.61	4.32	0.47	5.40
Jefferson	2610000500	Waste Disposal, Treatment, and Recovery	All Categories	Open Burning	Land Clearing Debris (use 28-10-005-000 for Logging Debris Burning)	62.49	212.46	212.46		144.98
Jefferson	2610030000	Waste Disposal, Treatment, and Recovery	Residential	Open Burning	Household Waste (use 26-10-000-xxx for Yard Wastes)	39.31	248.99	228.02	6.55	56.09
Jefferson	2630020000	Waste Disposal, Treatment, and Recovery	Public Owned	Wastewater Treatment	Total Processed					4.13
St. Charles	2102001000	Stationary Source Fuel Combustion	Anthracite Coal	Industrial	Total: All Boiler Types	-	-		-	-
St. Charles	2102002000	Stationary Source Fuel Combustion	Bituminous/Subbituminous Coal	Industrial	Total: All Boiler Types	121.74	132.81		799.05	0.55
St. Charles	2102004000	Stationary Source Fuel Combustion	Distillate Oil	Industrial	Total: Boilers and IC Engines	0.97	0.05		2.07	0.01
St. Charles	2102005000	Stationary Source Fuel Combustion	Residual Oil	Industrial	Total: All Boiler Types	0.84	0.32		5.42	0.00
St. Charles	2102006000	Stationary Source Fuel Combustion	Natural Gas	Industrial	Total: Boilers and IC Engines	0.66	0.00		0.00	0.04
St. Charles	2102007000	Stationary Source Fuel Combustion	Liquified Petroleum Gas (LPG)	Industrial	Total: All Boiler Types	-	-		-	-
St. Charles	2102008000	Stationary Source Fuel Combustion	Wood	Industrial	Total: All Boiler Types	10.52	23.92		1.20	0.81
St. Charles	2102011000	Stationary Source Fuel Combustion	Kerosene	Industrial	Total: All Boiler Types	-	-		-	-
St. Charles	2103001000	Stationary Source Fuel Combustion	Anthracite Coal	Commercial/Institutional	Total: All Boiler Types	-	-		-	-
St. Charles	2103002000	Stationary Source Fuel Combustion	Bituminous/Subbituminous Coal	Commercial/Institutional	Total: All Boiler Types	4.56	4.97		29.14	0.02
St. Charles	2103004000	Stationary Source Fuel Combustion	Distillate Oil	Commercial/Institutional	Total: Boilers and IC Engines	0.06	0.00		0.13	0.00
St. Charles	2103005000	Stationary Source Fuel Combustion	Residual Oil	Commercial/Institutional	Total: All Boiler Types	0.05	0.01		0.29	0.00
St. Charles	2103006000	Stationary Source Fuel Combustion	Natural Gas	Commercial/Institutional	Total: Boilers and IC Engines	11.11	0.01		0.07	0.61
St. Charles	2103007000	Stationary Source Fuel Combustion	Liquified Petroleum Gas (LPG)	Commercial/Institutional	Total: All Combustor Types	0.48	0.00		0.00	0.03
St. Charles	2103008000	Stationary Source Fuel Combustion	Wood	Commercial/Institutional	Total: All Boiler Types	0.81	1.85		0.09	0.06
St. Charles	2103011000	Stationary Source Fuel Combustion	Kerosene	Commercial/Institutional	Total: All Combustor Types	0.03	-		0.06	-
St. Charles	2104002000	Stationary Source Fuel Combustion	Bituminous/Subbituminous Coal	Residential	Total: All Combustor Types	3.71	2.53		42.85	4.08

County Name	Source Classification Code	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four	NOX	PM10-PRI	PM25-PRI	SO2	VOC
St. Charles	2104004000	Stationary Source Fuel Combustion	Distillate Oil	Residential	Total: All Combustor Types	2.56	0.15		6.05	0.10
St. Charles	2104006000	Stationary Source Fuel Combustion	Natural Gas	Residential	Total: All Combustor Types	244.54	0.52		1.56	14.31
St. Charles	2104007000	Stationary Source Fuel Combustion	Liquified Petroleum Gas (LPG)	Residential	Total: All Combustor Types	23.74	0.03		0.10	0.92
St. Charles	2104008100	Stationary Source Fuel Combustion	Wood	Residential	Fireplace: general	7.30	66.29	66.29	1.12	53.09
St. Charles	2104008210	Stationary Source Fuel Combustion	Wood	Residential	Woodstove: fireplace inserts; non-EPA certified	7.62	83.30	83.30	1.09	144.28
St. Charles	2104008220	Stationary Source Fuel Combustion	Wood	Residential	Woodstove: fireplace inserts; EPA certified; non-catalytic	1.99	17.11	17.11	0.35	10.48
St. Charles	2104008230	Stationary Source Fuel Combustion	Wood	Residential	Woodstove: fireplace inserts; EPA certified; catalytic	0.58	5.95	5.95	0.12	4.37
St. Charles	2104008310	Stationary Source Fuel Combustion	Wood	Residential	Woodstove: freestanding, non-EPA certified	6.90	75.38	75.38	0.99	130.56
St. Charles	2104008320	Stationary Source Fuel Combustion	Wood	Residential	Woodstove: freestanding, EPA certified, non-catalytic	1.80	15.48	15.48	0.32	9.47
St. Charles	2104008330	Stationary Source Fuel Combustion	Wood	Residential	Woodstove: freestanding, EPA certified, catalytic	0.53	5.36	5.36	0.11	3.94
St. Charles	2104008400	Stationary Source Fuel Combustion	Wood	Residential	Woodstove: pellet-fired, general (freestanding or FP insert)	2.97	2.39	2.39	0.25	0.03
St. Charles	2104008510	Stationary Source Fuel Combustion	Wood	Residential	Furnace: Indoor, cordwood-fired, non-EPA certified	1.26	18.82	18.82	1.38	8.05
St. Charles	2104008610	Stationary Source Fuel Combustion	Wood	Residential	Hydronic heater: outdoor	2.47	36.96	36.96	2.72	15.80
St. Charles	2104009000	Stationary Source Fuel Combustion	Firelog	Residential	Total: All Combustor Types	2.88	10.99	10.64		14.82
St. Charles	2104011000	Stationary Source Fuel Combustion	Kerosene	Residential	Total: All Heater Types	1.09	0.07		2.57	0.04
St. Charles	2294000000	Mobile Sources	All Paved Roads	Paved Roads	Total: Fugitives		2,059.15	114.35		
St. Charles	2296000000	Mobile Sources	All Unpaved Roads	Unpaved Roads	Total: Fugitives		9,674.06	964.31		
St. Charles	2302002100	Industrial Processes	Commercial Cooking - Charbroiling	Food and Kindred Products: SIC 20	Conveyorized Charbroiling		8.70	8.43		2.11
St. Charles	2302002200	Industrial Processes	Commercial Cooking - Charbroiling	Food and Kindred Products: SIC 20	Under-fired Charbroiling		61.63	59.66		7.25
St. Charles	2302003000	Industrial Processes	Commercial Cooking - Frying	Food and Kindred Products: SIC 20	Deep Fat Fying		-			2.20

County Name	Source Classification Code	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four	NOX	PM10-PRI	PM25-PRI	SO2	VOC
St. Charles	2302003100	Industrial Processes	Commercial Cooking - Frying	Food and Kindred Products: SIC 20	Flat Griddle Frying		18.01	13.69		1.04
St. Charles	2302003200	Industrial Processes	Commercial Cooking - Frying	Food and Kindred Products: SIC 20	Clamshell Griddle Frying		1.22	1.03		0.04
St. Charles	2311010000	Industrial Processes	Residential	Construction: SIC 15 - 17	Total		146.67	14.67		
St. Charles	2311020000	Industrial Processes	Industrial/Commercial/Institutional	Construction: SIC 15 - 17	Total		926.64	92.66		
St. Charles	2311030000	Industrial Processes	Road Construction	Construction: SIC 15 - 17	Total		858.71	85.87		
St. Charles	2401001000	Solvent Utilization	Architectural Coatings	Surface Coating	Total: All Solvent Types					527.61
St. Charles	2401005000	Solvent Utilization	Auto Refinishing: SIC 7532	Surface Coating	Total: All Solvent Types					71.07
St. Charles	2401008000	Solvent Utilization	Traffic Markings	Surface Coating	Total: All Solvent Types					18.78
St. Charles	2401015000	Solvent Utilization	Factory Finished Wood: SIC 2426 thru 242	Surface Coating	Total: All Solvent Types					2.37
St. Charles	2401020000	Solvent Utilization	Wood Furniture: SIC 25	Surface Coating	Total: All Solvent Types					11.24
St. Charles	2401025000	Solvent Utilization	Metal Furniture: SIC 25	Surface Coating	Total: All Solvent Types					-
St. Charles	2401030000	Solvent Utilization	Paper: SIC 26	Surface Coating	Total: All Solvent Types					-
St. Charles	2401040000	Solvent Utilization	Metal Cans: SIC 341	Surface Coating	Total: All Solvent Types					-
St. Charles	2401050000	Solvent Utilization	Miscellaneous Finished Metals: SIC 34 - (341 + 3498)	Surface Coating	Total: All Solvent Types					88.88
St. Charles	2401055000	Solvent Utilization	Machinery and Equipment: SIC 35	Surface Coating	Total: All Solvent Types					137.97
St. Charles	2401060000	Solvent Utilization	Large Appliances: SIC 363	Surface Coating	Total: All Solvent Types					0.93
St. Charles	2401065000	Solvent Utilization	Electronic and Other Electrical: SIC 36 - 363	Surface Coating	Total: All Solvent Types					-
St. Charles	2401070000	Solvent Utilization	Motor Vehicles: SIC 371	Surface Coating	Total: All Solvent Types					97.01
St. Charles	2401075000	Solvent Utilization	Aircraft: SIC 372	Surface Coating	Total: All Solvent Types					-
St. Charles	2401080000	Solvent Utilization	Marine: SIC 373	Surface Coating	Total: All Solvent Types					0.82
St. Charles	2401085000	Solvent Utilization	Railroad: SIC 374	Surface Coating	Total: All Solvent Types					5.91
St. Charles	2401090000	Solvent Utilization	Miscellaneous Manufacturing	Surface Coating	Total: All Solvent Types					60.66
St. Charles	2401100000	Solvent Utilization	Industrial Maintenance Coatings	Surface Coating	Total: All Solvent Types					192.17
St. Charles	2401200000	Solvent Utilization	Other Special Purpose Coatings	Surface Coating	Total: All Solvent Types					1.22
St. Charles	2415000000	Solvent Utilization	All Processes/All Industries	Degreasing	Total: All Solvent Types					184.72
St. Charles	2420000000	Solvent Utilization	All Processes	Dry Cleaning	Total: All Solvent Types					112.55

County Name	Source Classification Code	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four	NOX	PM10-PRI	PM25-PRI	SO2	VOC
St. Charles	2425000000	Solvent Utilization	All Processes	Graphic Arts	Total: All Solvent Types					831.61
St. Charles	2460100000	Solvent Utilization	All Personal Care Products	Miscellaneous Non-industrial: Consumer and Commercial	Total: All Solvent Types					331.94
St. Charles	2460200000	Solvent Utilization	All Household Products	Miscellaneous Non-industrial: Consumer and Commercial	Total: All Solvent Types					314.47
St. Charles	2460400000	Solvent Utilization	All Automotive Aftermarket Products	Miscellaneous Non-industrial: Consumer and Commercial	Total: All Solvent Types					237.60
St. Charles	2460500000	Solvent Utilization	All Coatings and Related Products	Miscellaneous Non-industrial: Consumer and Commercial	Total: All Solvent Types					165.97
St. Charles	2460600000	Solvent Utilization	All Adhesives and Sealants	Miscellaneous Non-industrial: Consumer and Commercial	Total: All Solvent Types					99.58
St. Charles	2460800000	Solvent Utilization	All FIFRA Related Products	Miscellaneous Non-industrial: Consumer and Commercial	Total: All Solvent Types					310.97
St. Charles	2460900000	Solvent Utilization	Miscellaneous Products (Not Otherwise Covered)	Miscellaneous Non-industrial: Consumer and Commercial	Total: All Solvent Types					12.23
St. Charles	2461021000	Solvent Utilization	Cutback Asphalt	Miscellaneous Non-industrial: Commercial	Total: All Solvent Types					74.55
St. Charles	2461022000	Solvent Utilization	Emulsified Asphalt	Miscellaneous Non-industrial: Commercial	Total: All Solvent Types					38.98
St. Charles	2501011011	Storage and Transport	Residential Portable Gas Cans	Petroleum and Petroleum Product Storage	Permeation					66.71
St. Charles	2501011012	Storage and Transport	Residential Portable Gas Cans	Petroleum and Petroleum Product Storage	Evaporation (includes Diurnal losses)					130.25
St. Charles	2501011013	Storage and Transport	Residential Portable Gas Cans	Petroleum and Petroleum Product Storage	Spillage During Transport					15.16
St. Charles	2501011014	Storage and Transport	Residential Portable Gas Cans	Petroleum and Petroleum Product Storage	Refilling at the Pump - Vapor Displacement					4.98
St. Charles	2501011015	Storage and Transport	Residential Portable Gas Cans	Petroleum and Petroleum Product Storage	Refilling at the Pump - Spillage					0.42
St. Charles	2501012011	Storage and Transport	Commercial Portable Gas Cans	Petroleum and Petroleum Product Storage	Permeation					2.13

County Name	Source Classification Code	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four	NOX	PM10-PRI	PM25-PRI	SO2	VOC
St. Charles	2501012012	Storage and Transport	Commercial Portable Gas Cans	Petroleum and Petroleum Product Storage	Evaporation (includes Diurnal losses)					4.16
St. Charles	2501012013	Storage and Transport	Commercial Portable Gas Cans	Petroleum and Petroleum Product Storage	Spillage During Transport					20.68
St. Charles	2501012014	Storage and Transport	Commercial Portable Gas Cans	Petroleum and Petroleum Product Storage	Refilling at the Pump - Vapor Displacement					9.60
St. Charles	2501012015	Storage and Transport	Commercial Portable Gas Cans	Petroleum and Petroleum Product Storage	Refilling at the Pump - Spillage					0.81
St. Charles	2501050120	Storage and Transport	Bulk Terminals: All Evaporative Losses	Petroleum and Petroleum Product Storage	Gasoline					40.94
St. Charles	2501055120	Storage and Transport	Bulk Plants: All Evaporative Losses	Petroleum and Petroleum Product Storage	Gasoline					31.82
St. Charles	2501060052	Storage and Transport	Gasoline Service Stations	Petroleum and Petroleum Product Storage	Stage 1: Splash Filling					795.18
St. Charles	2501060201	Storage and Transport	Gasoline Service Stations	Petroleum and Petroleum Product Storage	Underground Tank: Breathing and Emptying					77.57
St. Charles	2501080050	Storage and Transport	Airports : Aviation Gasoline	Petroleum and Petroleum Product Storage	Stage 1: Total					26.80
St. Charles	2501080100	Storage and Transport	Airports : Aviation Gasoline	Petroleum and Petroleum Product Storage	Stage 2: Total					1.39
St. Charles	2505030120	Storage and Transport	Truck	Petroleum and Petroleum Product Transport	Gasoline					5.07
St. Charles	2505040120	Storage and Transport	Pipeline	Petroleum and Petroleum Product Transport	Gasoline					34.79
St. Charles	2610000100	Waste Disposal, Treatment, and Recovery	All Categories	Open Burning	Yard Waste - Leaf Species Unspecified	-	-	-	-	-
St. Charles	2610000400	Waste Disposal, Treatment, and Recovery	All Categories	Open Burning	Yard Waste - Brush Species Unspecified	-	-	-	-	-
St. Charles	2610000500	Waste Disposal, Treatment, and Recovery	All Categories	Open Burning	Land Clearing Debris (use 28-10-005-000 for Logging Debris Burning)	-	-	-		-
St. Charles	2610030000	Waste Disposal, Treatment, and Recovery	Residential	Open Burning	Household Waste (use 26-10-000-xxx for Yard Wastes)	-	-	-	-	-
St. Charles	2630020000	Waste Disposal, Treatment, and Recovery	Public Owned	Wastewater Treatment	Total Processed					6.63
St. Louis	2102001000	Stationary Source Fuel Combustion	Anthracite Coal	Industrial	Total: All Boiler Types	-	-		-	-

County Name	Source Classification Code	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four	NOX	PM10-PRI	PM25-PRI	SO2	VOC
St. Louis	2102002000	Stationary Source Fuel Combustion	Bituminous/Subbituminous Coal	Industrial	Total: All Boiler Types	805.36	878.57		5,286.06	3.66
St. Louis	2102004000	Stationary Source Fuel Combustion	Distillate Oil	Industrial	Total: Boilers and IC Engines	6.43	0.32		13.69	0.06
St. Louis	2102005000	Stationary Source Fuel Combustion	Residual Oil	Industrial	Total: All Boiler Types	5.59	2.10		35.88	0.03
St. Louis	2102006000	Stationary Source Fuel Combustion	Natural Gas	Industrial	Total: Boilers and IC Engines	4.40	0.01		0.03	0.24
St. Louis	2102007000	Stationary Source Fuel Combustion	Liquified Petroleum Gas (LPG)	Industrial	Total: All Boiler Types	-	-		-	-
St. Louis	2102008000	Stationary Source Fuel Combustion	Wood	Industrial	Total: All Boiler Types	69.63	158.24		7.91	5.38
St. Louis	2102011000	Stationary Source Fuel Combustion	Kerosene	Industrial	Total: All Boiler Types	-	-		-	-
St. Louis	2103001000	Stationary Source Fuel Combustion	Anthracite Coal	Commercial/Institutional	Total: All Boiler Types	-	-		-	-
St. Louis	2103002000	Stationary Source Fuel Combustion	Bituminous/Subbituminous Coal	Commercial/Institutional	Total: All Boiler Types	5.21	5.69		33.31	0.02
St. Louis	2103004000	Stationary Source Fuel Combustion	Distillate Oil	Commercial/Institutional	Total: Boilers and IC Engines	0.07	0.00		0.14	0.00
St. Louis	2103005000	Stationary Source Fuel Combustion	Residual Oil	Commercial/Institutional	Total: All Boiler Types	0.05	0.01		0.33	0.00
St. Louis	2103006000	Stationary Source Fuel Combustion	Natural Gas	Commercial/Institutional	Total: Boilers and IC Engines	12.70	0.02		0.08	0.70
St. Louis	2103007000	Stationary Source Fuel Combustion	Liquified Petroleum Gas (LPG)	Commercial/Institutional	Total: All Combustor Types	0.55	0.00		0.00	0.03
St. Louis	2103008000	Stationary Source Fuel Combustion	Wood	Commercial/Institutional	Total: All Boiler Types	0.93	2.11		0.11	0.07
St. Louis	2103011000	Stationary Source Fuel Combustion	Kerosene	Commercial/Institutional	Total: All Combustor Types	0.03	-		0.07	-
St. Louis	2104002000	Stationary Source Fuel Combustion	Bituminous/Subbituminous Coal	Residential	Total: All Combustor Types	2.78	1.90		32.14	3.06
St. Louis	2104004000	Stationary Source Fuel Combustion	Distillate Oil	Residential	Total: All Combustor Types	4.28	0.26		10.12	0.17
St. Louis	2104006000	Stationary Source Fuel Combustion	Natural Gas	Residential	Total: All Combustor Types	1,179.32	2.51		7.53	69.00
St. Louis	2104007000	Stationary Source Fuel Combustion	Liquified Petroleum Gas (LPG)	Residential	Total: All Combustor Types	16.21	0.02		0.07	0.63
St. Louis	2104008100	Stationary Source Fuel Combustion	Wood	Residential	Fireplace: general	22.60	205.12	205.12	3.48	164.27
St. Louis	2104008210	Stationary Source Fuel Combustion	Wood	Residential	Woodstove: fireplace inserts; non-EPA certified	23.58	257.71	257.71	3.37	446.37
St. Louis	2104008220	Stationary Source Fuel Combustion	Wood	Residential	Woodstove: fireplace inserts; EPA certified; non-catalytic	6.16	52.94	52.94	1.08	32.41
St. Louis	2104008230	Stationary Source Fuel Combustion	Wood	Residential	Woodstove: fireplace inserts; EPA certified; catalytic	1.80	18.38	18.38	0.36	13.52

County Name	Source Classification Code	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four	NOX	PM10-PRI	PM25-PRI	SO2	VOC
St. Louis	2104008310	Stationary Source Fuel Combustion	Wood	Residential	Woodstove: freestanding, non-EPA certified	21.34	233.18	233.18	3.05	403.88
St. Louis	2104008320	Stationary Source Fuel Combustion	Wood	Residential	Woodstove: freestanding, EPA certified, non-catalytic	5.57	47.89	47.89	0.98	29.32
St. Louis	2104008330	Stationary Source Fuel Combustion	Wood	Residential	Woodstove: freestanding, EPA certified, catalytic	1.63	16.61	16.61	0.33	12.21
St. Louis	2104008400	Stationary Source Fuel Combustion	Wood	Residential	Woodstove: pellet-fired, general (freestanding or FP insert)	9.34	7.52	7.52	0.79	0.10
St. Louis	2104008510	Stationary Source Fuel Combustion	Wood	Residential	Furnace: Indoor, cordwood-fired, non-EPA certified	4.15	62.17	62.17	4.57	26.58
St. Louis	2104008610	Stationary Source Fuel Combustion	Wood	Residential	Hydronic heater: outdoor	7.64	114.50	114.50	8.42	48.95
St. Louis	2104009000	Stationary Source Fuel Combustion	Firelog	Residential	Total: All Combustor Types	9.06	34.58	33.49		46.66
St. Louis	2104011000	Stationary Source Fuel Combustion	Kerosene	Residential	Total: All Heater Types	1.82	0.11		4.30	0.07
St. Louis	2294000000	Mobile Sources	All Paved Roads	Paved Roads	Total: Fugitives		7,213.10	355.93		
St. Louis	2296000000	Mobile Sources	All Unpaved Roads	Unpaved Roads	Total: Fugitives		5,650.47	563.24		
St. Louis	2302002100	Industrial Processes	Commercial Cooking - Charbroiling	Food and Kindred Products: SIC 20	Conveyorized Charbroiling		24.69	23.94		5.98
St. Louis	2302002200	Industrial Processes	Commercial Cooking - Charbroiling	Food and Kindred Products: SIC 20	Under-fired Charbroiling		174.94	169.36		20.57
St. Louis	2302003000	Industrial Processes	Commercial Cooking - Frying	Food and Kindred Products: SIC 20	Deep Fat Fying					6.25
St. Louis	2302003100	Industrial Processes	Commercial Cooking - Frying	Food and Kindred Products: SIC 20	Flat Griddle Frying		51.13	38.85		2.95
St. Louis	2302003200	Industrial Processes	Commercial Cooking - Frying	Food and Kindred Products: SIC 20	Clamshell Griddle Frying		3.47	2.93		0.11
St. Louis	2311010000	Industrial Processes	Residential	Construction: SIC 15 - 17	Total		71.06	7.11		
St. Louis	2311020000	Industrial Processes	Industrial/Commercial/Institutional	Construction: SIC 15 - 17	Total		16,345.90	1,634.59		
St. Louis	2311030000	Industrial Processes	Road Construction	Construction: SIC 15 - 17	Total		456.08	45.61		
St. Louis	2401001000	Solvent Utilization	Architectural Coatings	Surface Coating	Total: All Solvent Types					1,497.67
St. Louis	2401005000	Solvent Utilization	Auto Refinishing: SIC 7532	Surface Coating	Total: All Solvent Types					370.33
St. Louis	2401008000	Solvent Utilization	Traffic Markings	Surface Coating	Total: All Solvent Types					52.22
St. Louis	2401015000	Solvent Utilization	Factory Finished Wood: SIC 2426 thru 242	Surface Coating	Total: All Solvent Types					4.28
St. Louis	2401020000	Solvent Utilization	Wood Furniture: SIC 25	Surface Coating	Total: All Solvent Types					98.92

County Name	Source Classification Code	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four	NOX	PM10-PRI	PM25-PRI	SO2	VOC
St. Louis	2401025000	Solvent Utilization	Metal Furniture: SIC 25	Surface Coating	Total: All Solvent Types					86.80
St. Louis	2401030000	Solvent Utilization	Paper: SIC 26	Surface Coating	Total: All Solvent Types					21.69
St. Louis	2401040000	Solvent Utilization	Metal Cans: SIC 341	Surface Coating	Total: All Solvent Types					63.81
St. Louis	2401050000	Solvent Utilization	Miscellaneous Finished Metals: SIC 34 - (341 + 3498)	Surface Coating	Total: All Solvent Types					74.50
St. Louis	2401055000	Solvent Utilization	Machinery and Equipment: SIC 35	Surface Coating	Total: All Solvent Types					208.30
St. Louis	2401060000	Solvent Utilization	Large Appliances: SIC 363	Surface Coating	Total: All Solvent Types					-
St. Louis	2401065000	Solvent Utilization	Electronic and Other Electrical: SIC 36 - 363	Surface Coating	Total: All Solvent Types					0.27
St. Louis	2401070000	Solvent Utilization	Motor Vehicles: SIC 371	Surface Coating	Total: All Solvent Types					414.80
St. Louis	2401075000	Solvent Utilization	Aircraft: SIC 372	Surface Coating	Total: All Solvent Types					-
St. Louis	2401080000	Solvent Utilization	Marine: SIC 373	Surface Coating	Total: All Solvent Types					8.49
St. Louis	2401085000	Solvent Utilization	Railroad: SIC 374	Surface Coating	Total: All Solvent Types					-
St. Louis	2401090000	Solvent Utilization	Miscellaneous Manufacturing	Surface Coating	Total: All Solvent Types					189.04
St. Louis	2401100000	Solvent Utilization	Industrial Maintenance Coatings	Surface Coating	Total: All Solvent Types					545.51
St. Louis	2401200000	Solvent Utilization	Other Special Purpose Coatings	Surface Coating	Total: All Solvent Types					3.47
St. Louis	2415000000	Solvent Utilization	All Processes/All Industries	Degreasing	Total: All Solvent Types					563.45
St. Louis	2420000000	Solvent Utilization	All Processes	Dry Cleaning	Total: All Solvent Types					404.19
St. Louis	2425000000	Solvent Utilization	All Processes	Graphic Arts	Total: All Solvent Types					3,440.83
St. Louis	2460100000	Solvent Utilization	All Personal Care Products	Miscellaneous Non-industrial: Consumer and Commercial	Total: All Solvent Types					942.24
St. Louis	2460200000	Solvent Utilization	All Household Products	Miscellaneous Non-industrial: Consumer and Commercial	Total: All Solvent Types					892.65
St. Louis	2460400000	Solvent Utilization	All Automotive Aftermarket Products	Miscellaneous Non-industrial: Consumer and Commercial	Total: All Solvent Types					674.45
St. Louis	2460500000	Solvent Utilization	All Coatings and Related Products	Miscellaneous Non-industrial: Consumer and Commercial	Total: All Solvent Types					471.12

County Name	Source Classification Code	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four	NOX	PM10-PRI	PM25-PRI	SO2	VOC
St. Louis	2460600000	Solvent Utilization	All Adhesives and Sealants	Miscellaneous Non-industrial: Consumer and Commercial	Total: All Solvent Types					282.67
St. Louis	2460800000	Solvent Utilization	All FIFRA Related Products	Miscellaneous Non-industrial: Consumer and Commercial	Total: All Solvent Types					882.73
St. Louis	2460900000	Solvent Utilization	Miscellaneous Products (Not Otherwise Covered)	Miscellaneous Non-industrial: Consumer and Commercial	Total: All Solvent Types					34.71
St. Louis	2461021000	Solvent Utilization	Cutback Asphalt	Miscellaneous Non-industrial: Commercial	Total: All Solvent Types					318.28
St. Louis	2461022000	Solvent Utilization	Emulsified Asphalt	Miscellaneous Non-industrial: Commercial	Total: All Solvent Types					166.41
St. Louis	2501011011	Storage and Transport	Residential Portable Gas Cans	Petroleum and Petroleum Product Storage	Permeation					382.31
St. Louis	2501011012	Storage and Transport	Residential Portable Gas Cans	Petroleum and Petroleum Product Storage	Evaporation (includes Diurnal losses)					746.44
St. Louis	2501011013	Storage and Transport	Residential Portable Gas Cans	Petroleum and Petroleum Product Storage	Spillage During Transport					86.89
St. Louis	2501011014	Storage and Transport	Residential Portable Gas Cans	Petroleum and Petroleum Product Storage	Refilling at the Pump - Vapor Displacement					28.53
St. Louis	2501011015	Storage and Transport	Residential Portable Gas Cans	Petroleum and Petroleum Product Storage	Refilling at the Pump - Spillage					2.41
St. Louis	2501012011	Storage and Transport	Commercial Portable Gas Cans	Petroleum and Petroleum Product Storage	Permeation					12.21
St. Louis	2501012012	Storage and Transport	Commercial Portable Gas Cans	Petroleum and Petroleum Product Storage	Evaporation (includes Diurnal losses)					23.84
St. Louis	2501012013	Storage and Transport	Commercial Portable Gas Cans	Petroleum and Petroleum Product Storage	Spillage During Transport					118.54
St. Louis	2501012014	Storage and Transport	Commercial Portable Gas Cans	Petroleum and Petroleum Product Storage	Refilling at the Pump - Vapor Displacement					54.99
St. Louis	2501012015	Storage and Transport	Commercial Portable Gas Cans	Petroleum and Petroleum Product Storage	Refilling at the Pump - Spillage					4.65
St. Louis	2501050120	Storage and Transport	Bulk Terminals: All Evaporative Losses	Petroleum and Petroleum Product Storage	Gasoline					204.18
St. Louis	2501055120	Storage and Transport	Bulk Plants: All Evaporative Losses	Petroleum and Petroleum Product Storage	Gasoline					164.47

County Name	Source Classification Code	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four	NOX	PM10-PRI	PM25-PRI	SO2	VOC
St. Louis	2501060052	Storage and Transport	Gasoline Service Stations	Petroleum and Petroleum Product Storage	Stage 1: Splash Filling					3,571.91
St. Louis	2501060201	Storage and Transport	Gasoline Service Stations	Petroleum and Petroleum Product Storage	Underground Tank: Breathing and Emptying					348.44
St. Louis	2501080050	Storage and Transport	Airports : Aviation Gasoline	Petroleum and Petroleum Product Storage	Stage 1: Total					55.24
St. Louis	2501080100	Storage and Transport	Airports : Aviation Gasoline	Petroleum and Petroleum Product Storage	Stage 2: Total					2.87
St. Louis	2505030120	Storage and Transport	Truck	Petroleum and Petroleum Product Transport	Gasoline					22.79
St. Louis	2505040120	Storage and Transport	Pipeline	Petroleum and Petroleum Product Transport	Gasoline					179.58
St. Louis	2610000100	Waste Disposal, Treatment, and Recovery	All Categories	Open Burning	Yard Waste - Leaf Species Unspecified	-	-	-	-	-
St. Louis	2610000400	Waste Disposal, Treatment, and Recovery	All Categories	Open Burning	Yard Waste - Brush Species Unspecified	-	-	-	-	-
St. Louis	2610000500	Waste Disposal, Treatment, and Recovery	All Categories	Open Burning	Land Clearing Debris (use 28-10-005-000 for Logging Debris Burning)	-	-	-		-
St. Louis	2610030000	Waste Disposal, Treatment, and Recovery	Residential	Open Burning	Household Waste (use 26-10-000-xxx for Yard Wastes)	-	-	-	-	-
St. Louis	2630020000	Waste Disposal, Treatment, and Recovery	Public Owned	Wastewater Treatment	Total Processed					18.82
St. Louis City	2102001000	Stationary Source Fuel Combustion	Anthracite Coal	Industrial	Total: All Boiler Types	-	-		-	-
St. Louis City	2102002000	Stationary Source Fuel Combustion	Bituminous/Subbituminous Coal	Industrial	Total: All Boiler Types	481.19	524.93		3,158.32	2.19
St. Louis City	2102004000	Stationary Source Fuel Combustion	Distillate Oil	Industrial	Total: Boilers and IC Engines	3.84	0.19		8.18	0.04
St. Louis City	2102005000	Stationary Source Fuel Combustion	Residual Oil	Industrial	Total: All Boiler Types	3.34	1.26		21.43	0.02
St. Louis City	2102006000	Stationary Source Fuel Combustion	Natural Gas	Industrial	Total: Boilers and IC Engines	2.63	0.00		0.02	0.14
St. Louis City	2102007000	Stationary Source Fuel Combustion	Liquified Petroleum Gas (LPG)	Industrial	Total: All Boiler Types	-	-		-	-
St. Louis City	2102008000	Stationary Source Fuel Combustion	Wood	Industrial	Total: All Boiler Types	41.60	94.55		4.73	3.21
St. Louis City	2102011000	Stationary Source Fuel Combustion	Kerosene	Industrial	Total: All Boiler Types	-	-		-	-
St. Louis City	2103001000	Stationary Source Fuel Combustion	Anthracite Coal	Commercial/Institutional	Total: All Boiler Types	-	-		-	-

County Name	Source Classification Code	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four	NOX	PM10-PRI	PM25-PRI	SO2	VOC
St. Louis City	2103002000	Stationary Source Fuel Combustion	Bituminous/Subbituminous Coal	Commercial/Institutional	Total: All Boiler Types	4.55	4.96		29.05	0.02
St. Louis City	2103004000	Stationary Source Fuel Combustion	Distillate Oil	Commercial/Institutional	Total: Boilers and IC Engines	0.06	0.00		0.12	0.00
St. Louis City	2103005000	Stationary Source Fuel Combustion	Residual Oil	Commercial/Institutional	Total: All Boiler Types	0.05	0.01		0.29	0.00
St. Louis City	2103006000	Stationary Source Fuel Combustion	Natural Gas	Commercial/Institutional	Total: Boilers and IC Engines	11.08	0.01		0.07	0.61
St. Louis City	2103007000	Stationary Source Fuel Combustion	Liquified Petroleum Gas (LPG)	Commercial/Institutional	Total: All Combustor Types	0.48	0.00		0.00	0.03
St. Louis City	2103008000	Stationary Source Fuel Combustion	Wood	Commercial/Institutional	Total: All Boiler Types	0.81	1.84		0.09	0.06
St. Louis City	2103011000	Stationary Source Fuel Combustion	Kerosene	Commercial/Institutional	Total: All Combustor Types	0.03	-		0.06	-
St. Louis City	2104002000	Stationary Source Fuel Combustion	Bituminous/Subbituminous Coal	Residential	Total: All Combustor Types	2.78	1.90		32.14	3.06
St. Louis City	2104004000	Stationary Source Fuel Combustion	Distillate Oil	Residential	Total: All Combustor Types	3.42	0.21		8.10	0.13
St. Louis City	2104006000	Stationary Source Fuel Combustion	Natural Gas	Residential	Total: All Combustor Types	431.86	0.92		2.76	25.27
St. Louis City	2104007000	Stationary Source Fuel Combustion	Liquified Petroleum Gas (LPG)	Residential	Total: All Combustor Types	8.20	0.01		0.03	0.32
St. Louis City	2104008100	Stationary Source Fuel Combustion	Wood	Residential	Fireplace: general	7.74	70.27	70.27	1.19	56.27
St. Louis City	2104008210	Stationary Source Fuel Combustion	Wood	Residential	Woodstove: fireplace inserts; non-EPA certified	8.08	88.30	88.30	1.15	152.94
St. Louis City	2104008220	Stationary Source Fuel Combustion	Wood	Residential	Woodstove: fireplace inserts; EPA certified; non-catalytic	2.11	18.13	18.13	0.37	11.10
St. Louis City	2104008230	Stationary Source Fuel Combustion	Wood	Residential	Woodstove: fireplace inserts; EPA certified; catalytic	0.62	6.28	6.28	0.12	4.62
St. Louis City	2104008310	Stationary Source Fuel Combustion	Wood	Residential	Woodstove: freestanding, non-EPA certified	7.31	79.89	79.89	1.04	138.37
St. Louis City	2104008320	Stationary Source Fuel Combustion	Wood	Residential	Woodstove: freestanding, EPA certified, non-catalytic	1.91	16.40	16.40	0.33	10.04
St. Louis City	2104008330	Stationary Source Fuel Combustion	Wood	Residential	Woodstove: freestanding, EPA certified, catalytic	0.56	5.67	5.67	0.11	4.17
St. Louis City	2104008400	Stationary Source Fuel Combustion	Wood	Residential	Woodstove: pellet-fired, general (freestanding or FP insert)	3.39	2.73	2.73	0.29	0.04
St. Louis City	2104008510	Stationary Source Fuel Combustion	Wood	Residential	Furnace: Indoor, cordwood-fired, non-EPA certified	1.42	21.25	21.25	1.56	9.09

County Name	Source Classification Code	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four	NOX	PM10-PRI	PM25-PRI	SO2	VOC
St. Louis City	2104008610	Stationary Source Fuel Combustion	Wood	Residential	Hydronic heater: outdoor	2.62	39.22	39.22	2.88	16.77
St. Louis City	2104009000	Stationary Source Fuel Combustion	Firelog	Residential	Total: All Combustor Types	3.29	12.54	12.15		16.92
St. Louis City	2104011000	Stationary Source Fuel Combustion	Kerosene	Residential	Total: All Heater Types	1.45	0.09		3.44	0.06
St. Louis City	2294000000	Mobile Sources	All Paved Roads	Paved Roads	Total: Fugitives		2,753.47	136.45		
St. Louis City	2296000000	Mobile Sources	All Unpaved Roads	Unpaved Roads	Total: Fugitives		-	-		
St. Louis City	2302002100	Industrial Processes	Commercial Cooking - Charbroiling	Food and Kindred Products: SIC 20	Conveyorized Charbroiling		8.82	8.55		2.14
St. Louis City	2302002200	Industrial Processes	Commercial Cooking - Charbroiling	Food and Kindred Products: SIC 20	Under-fired Charbroiling		62.50	60.51		7.35
St. Louis City	2302003000	Industrial Processes	Commercial Cooking - Frying	Food and Kindred Products: SIC 20	Deep Fat Fying					2.23
St. Louis City	2302003100	Industrial Processes	Commercial Cooking - Frying	Food and Kindred Products: SIC 20	Flat Griddle Frying		18.27	13.88		1.05
St. Louis City	2302003200	Industrial Processes	Commercial Cooking - Frying	Food and Kindred Products: SIC 20	Clamshell Griddle Frying		1.24	1.05		0.04
St. Louis City	2311010000	Industrial Processes	Residential	Construction: SIC 15 - 17	Total		29.03	2.90		
St. Louis City	2311020000	Industrial Processes	Industrial/Commercial/Institutional	Construction: SIC 15 - 17	Total		4,775.60	477.56		
St. Louis City	2311030000	Industrial Processes	Road Construction	Construction: SIC 15 - 17	Total		104.66	10.47		
St. Louis City	2401001000	Solvent Utilization	Architectural Coatings	Surface Coating	Total: All Solvent Types					535.09
St. Louis City	2401005000	Solvent Utilization	Auto Refinishing: SIC 7532	Surface Coating	Total: All Solvent Types					63.23
St. Louis City	2401008000	Solvent Utilization	Traffic Markings	Surface Coating	Total: All Solvent Types					12.57
St. Louis City	2401015000	Solvent Utilization	Factory Finished Wood: SIC 2426 thru 242	Surface Coating	Total: All Solvent Types					3.05
St. Louis City	2401020000	Solvent Utilization	Wood Furniture: SIC 25	Surface Coating	Total: All Solvent Types					110.85
St. Louis City	2401025000	Solvent Utilization	Metal Furniture: SIC 25	Surface Coating	Total: All Solvent Types					188.80
St. Louis City	2401030000	Solvent Utilization	Paper: SIC 26	Surface Coating	Total: All Solvent Types					13.91
St. Louis City	2401040000	Solvent Utilization	Metal Cans: SIC 341	Surface Coating	Total: All Solvent Types					63.81
St. Louis City	2401050000	Solvent Utilization	Miscellaneous Finished Metals: SIC 34 - (341 + 3498)	Surface Coating	Total: All Solvent Types					180.88
St. Louis City	2401055000	Solvent Utilization	Machinery and Equipment: SIC 35	Surface Coating	Total: All Solvent Types					29.51
St. Louis City	2401060000	Solvent Utilization	Large Appliances: SIC 363	Surface Coating	Total: All Solvent Types					-
St. Louis City	2401065000	Solvent Utilization	Electronic and Other Electrical: SIC 36 - 363	Surface Coating	Total: All Solvent Types					2.17
St. Louis City	2401070000	Solvent Utilization	Motor Vehicles: SIC 371	Surface Coating	Total: All Solvent Types					38.01

County Name	Source Classification Code	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four	NOX	PM10-PRI	PM25-PRI	SO2	VOC
St. Louis City	2401075000	Solvent Utilization	Aircraft: SIC 372	Surface Coating	Total: All Solvent Types					-
St. Louis City	2401080000	Solvent Utilization	Marine: SIC 373	Surface Coating	Total: All Solvent Types					1.42
St. Louis City	2401085000	Solvent Utilization	Railroad: SIC 374	Surface Coating	Total: All Solvent Types					-
St. Louis City	2401090000	Solvent Utilization	Miscellaneous Manufacturing	Surface Coating	Total: All Solvent Types					43.79
St. Louis City	2401100000	Solvent Utilization	Industrial Maintenance Coatings	Surface Coating	Total: All Solvent Types					194.90
St. Louis City	2401200000	Solvent Utilization	Other Special Purpose Coatings	Surface Coating	Total: All Solvent Types					1.24
St. Louis City	2415000000	Solvent Utilization	All Processes/All Industries	Degreasing	Total: All Solvent Types					269.09
St. Louis City	2420000000	Solvent Utilization	All Processes	Dry Cleaning	Total: All Solvent Types					220.89
St. Louis City	2425000000	Solvent Utilization	All Processes	Graphic Arts	Total: All Solvent Types					1,695.45
St. Louis City	2460100000	Solvent Utilization	All Personal Care Products	Miscellaneous Non-industrial: Consumer and Commercial	Total: All Solvent Types					336.64
St. Louis City	2460200000	Solvent Utilization	All Household Products	Miscellaneous Non-industrial: Consumer and Commercial	Total: All Solvent Types					318.93
St. Louis City	2460400000	Solvent Utilization	All Automotive Aftermarket Products	Miscellaneous Non-industrial: Consumer and Commercial	Total: All Solvent Types					240.97
St. Louis City	2460500000	Solvent Utilization	All Coatings and Related Products	Miscellaneous Non-industrial: Consumer and Commercial	Total: All Solvent Types					168.32
St. Louis City	2460600000	Solvent Utilization	All Adhesives and Sealants	Miscellaneous Non-industrial: Consumer and Commercial	Total: All Solvent Types					100.99
St. Louis City	2460800000	Solvent Utilization	All FIFRA Related Products	Miscellaneous Non-industrial: Consumer and Commercial	Total: All Solvent Types					315.38
St. Louis City	2460900000	Solvent Utilization	Miscellaneous Products (Not Otherwise Covered)	Miscellaneous Non-industrial: Consumer and Commercial	Total: All Solvent Types					12.40
St. Louis City	2461021000	Solvent Utilization	Cutback Asphalt	Miscellaneous Non-industrial: Commercial	Total: All Solvent Types					115.27
St. Louis City	2461022000	Solvent Utilization	Emulsified Asphalt	Miscellaneous Non-industrial: Commercial	Total: All Solvent Types					60.27

County Name	Source Classification Code	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four	NOX	PM10-PRI	PM25-PRI	SO2	VOC
St. Louis City	2501011011	Storage and Transport	Residential Portable Gas Cans	Petroleum and Petroleum Product Storage	Permeation					59.21
St. Louis City	2501011012	Storage and Transport	Residential Portable Gas Cans	Petroleum and Petroleum Product Storage	Evaporation (includes Diurnal losses)					115.61
St. Louis City	2501011013	Storage and Transport	Residential Portable Gas Cans	Petroleum and Petroleum Product Storage	Spillage During Transport					13.46
St. Louis City	2501011014	Storage and Transport	Residential Portable Gas Cans	Petroleum and Petroleum Product Storage	Refilling at the Pump - Vapor Displacement					4.42
St. Louis City	2501011015	Storage and Transport	Residential Portable Gas Cans	Petroleum and Petroleum Product Storage	Refilling at the Pump - Spillage					0.37
St. Louis City	2501012011	Storage and Transport	Commercial Portable Gas Cans	Petroleum and Petroleum Product Storage	Permeation					1.89
St. Louis City	2501012012	Storage and Transport	Commercial Portable Gas Cans	Petroleum and Petroleum Product Storage	Evaporation (includes Diurnal losses)					3.69
St. Louis City	2501012013	Storage and Transport	Commercial Portable Gas Cans	Petroleum and Petroleum Product Storage	Spillage During Transport					18.36
St. Louis City	2501012014	Storage and Transport	Commercial Portable Gas Cans	Petroleum and Petroleum Product Storage	Refilling at the Pump - Vapor Displacement					8.52
St. Louis City	2501012015	Storage and Transport	Commercial Portable Gas Cans	Petroleum and Petroleum Product Storage	Refilling at the Pump - Spillage					0.72
St. Louis City	2501050120	Storage and Transport	Bulk Terminals: All Evaporative Losses	Petroleum and Petroleum Product Storage	Gasoline					219.07
St. Louis City	2501055120	Storage and Transport	Bulk Plants: All Evaporative Losses	Petroleum and Petroleum Product Storage	Gasoline					170.29
St. Louis City	2501060052	Storage and Transport	Gasoline Service Stations	Petroleum and Petroleum Product Storage	Stage 1: Splash Filling					913.01
St. Louis City	2501060201	Storage and Transport	Gasoline Service Stations	Petroleum and Petroleum Product Storage	Underground Tank: Breathing and Emptying					89.06
St. Louis City	2501080050	Storage and Transport	Airports : Aviation Gasoline	Petroleum and Petroleum Product Storage	Stage 1: Total					0.73
St. Louis City	2501080100	Storage and Transport	Airports : Aviation Gasoline	Petroleum and Petroleum Product Storage	Stage 2: Total					0.04
St. Louis City	2505030120	Storage and Transport	Truck	Petroleum and Petroleum Product Transport	Gasoline					5.82
St. Louis City	2505040120	Storage and Transport	Pipeline	Petroleum and Petroleum Product Transport	Gasoline					186.16

County Name	Source Classification Code	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four	NOX	PM10-PRI	PM25-PRI	SO2	VOC
St. Louis City	2610000100	Waste Disposal, Treatment, and Recovery	All Categories	Open Burning	Yard Waste - Leaf Species Unspecified	-	-	-	-	-
St. Louis City	2610000400	Waste Disposal, Treatment, and Recovery	All Categories	Open Burning	Yard Waste - Brush Species Unspecified	-	-	-	-	-
St. Louis City	2610000500	Waste Disposal, Treatment, and Recovery	All Categories	Open Burning	Land Clearing Debris (use 28-10-005-000 for Logging Debris Burning)	-	-	-		-
St. Louis City	2610030000	Waste Disposal, Treatment, and Recovery	Residential	Open Burning	Household Waste (use 26-10-000-xxx for Yard Wastes)	-	-	-	-	-
St. Louis City	2630020000	Waste Disposal, Treatment, and Recovery	Public Owned	Wastewater Treatment	Total Processed					6.72
STLNA Tons Per Year						4,426	102,344	12,695	11,538	38,316

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Table 9 Nonpoint Category Overview of Methodology

SCC	Category Name	Number of SCCs	Pollutants Included	Point Source Subtraction	Category Submitted by Missouri - Calculation Method	Category Submitted by EPA - Calculation Method	Emission Factor Source	Activity for Category	Activity Base Year
21030* and 21020*	Industrial and Commercial Institutional Fuel Combustion	16	CAP	Yes	EPA/CENRAP Template including energy intensity per sector NAICS		Huntley 2009 [6]	2006 EIA's SEDS [1]	2006
2401005000	Automobile Refinishing	1	VOC and 5 HAPS	No	EPA Template - emissions based on employment		Solvent Documentation [4]	Employment from 2006 *County Business Patterns* [2]	2006
2401015000	Wood and Flat Stock (Factory Finished Wood)	1	VOC and 6 HAPs	Yes	EPA Template - emissions based on employment		Solvent Documentation [4]	Employment from 2006 *County Business Patterns* [2]	2006
2401020000	Wood Furniture	1	VOC only	Yes	EPA Template - emissions based on employment		Solvent Documentation [4]	Employment from 2006 *County Business Patterns* [2]	2006
2401025000	Metal Furniture	1	VOC and 6 HAPs	Yes	EPA Template - emissions based on employment		Solvent Documentation [4]	Employment from 2006 *County Business Patterns* [2]	2006

SCC	Category Name	Number of SCCs	Pollutants Included	Point Source Subtraction	Category Submitted by Missouri - Calculation Method	Category Submitted by EPA - Calculation Method	Emission Factor Source	Activity for Category	Activity Base Year
2401030000	Paper Film Foil	1	VOC and 6 HAPs	Yes	EPA Template - emissions based on employment		Solvent Documentation [4]	Employment from 2006 *County Business Patterns* [2]	2006
2401040000	Metal Cans	1	VOC and 6 HAPs	Yes	EPA Template - emissions based on employment		Solvent Documentation [4]	Employment from 2006 *County Business Patterns* [2]	2006
2401045000	Metal Coil Only	1	VOC and 6 HAPs	No	EPA Template - emissions based on employment		Solvent Documentation [4]	Employment from 2006 *County Business Patterns* [2]	2006
2401050000	Metal Sheet Strip and Coil	1	VOC and 6 HAPs	Yes	EPA Template - emissions based on employment, HAPs not included in template were created by MODNR		Solvent Documentation [4]	Employment from 2006 *County Business Patterns* [2]	2006

SCC	Category Name	Number of SCCs	Pollutants Included	Point Source Subtraction	Category Submitted by Missouri - Calculation Method	Category Submitted by EPA - Calculation Method	Emission Factor Source	Activity for Category	Activity Base Year
2401055000	Machinery and Equipment	1	VOC and 6 HAPs	Yes	EPA Template - emissions based on employment		Solvent Documentation [4]	Employment from 2006 *County Business Patterns* [2]	2006
2401060000	Appliances	1	VOC and 6 HAPs	No	EPA Template - emissions based on employment		Solvent Documentation [4]	Employment from 2006 *County Business Patterns* [2]	2006
2401065000	Electronic and other special coatings	1	VOC and 6 HAPs	Yes	EPA Template - emissions based on employment		Solvent Documentation [4]	Employment from 2006 *County Business Patterns* [2]	2006
2401070000	Motor Vehicles	1	VOC and 6 HAPs	Yes	EPA Template - emissions based on employment, HAPs not included in template were created by MODNR		Solvent Documentation [4]	Employment from 2006 *County Business Patterns* [2]	2006

SCC	Category Name	Number of SCCs	Pollutants Included	Point Source Subtraction	Category Submitted by Missouri - Calculation Method	Category Submitted by EPA - Calculation Method	Emission Factor Source	Activity for Category	Activity Base Year
2401075000	Aircraft	1	VOC and 6 HAPs	Yes	EPA Template - emissions based on employment, HAPs not included in template were created by MODNR		Solvent Documentation [4]	Employment from 2006 *County Business Patterns* [2]	2006
2401085000	Railroads	1	VOC and 6 HAPs	Yes	EPA Template - emissions based on employment		Solvent Documentation [4]	Employment from 2006 *County Business Patterns* [2]	2006
2401080000	Marine Coatings	1	VOC and 6 HAPs	Yes	EPA Template - emissions based on employment, HAPs not included in template were created by MODNR		Solvent Documentation [4]	Employment from 2006 *County Business Patterns* [2]	2006

SCC	Category Name	Number of SCCs	Pollutants Included	Point Source Subtraction	Category Submitted by Missouri - Calculation Method	Category Submitted by EPA - Calculation Method	Emission Factor Source	Activity for Category	Activity Base Year
2401090000	Misc Manufacturing	1	VOC and 6 HAPs	Yes	EPA Template - emissions based on employment, HAPs not included in template were created by MODNR		Solvent Documentation [4]	Employment from 2006 *County Business Patterns* [2]	2006
2415000000	Degreasing	1	VOC and 1 HAP	Yes	EPA Template - emissions based on employment		Solvent Documentation [4]	Employment from 2006 *County Business Patterns* [2]	2006
2420000000	Dry Cleaning	1	VOC only	No	EPA Template - emissions based on employment		Solvent Documentation [4]	Employment from 2006 *County Business Patterns* [2]	2006
2425000000	Graphic Arts	1	VOC and 5 HAPs	Yes	EPA Template - emissions based on employment		Solvent Documentation [4]	Employment from 2006 *County Business Patterns* [2]	2006

SCC	Category Name	Number of SCCs	Pollutants Included	Point Source Subtraction	Category Submitted by Missouri - Calculation Method	Category Submitted by EPA - Calculation Method	Emission Factor Source	Activity for Category	Activity Base Year
2401001000	Architectural Coatings	1	VOC and 5 HAPs	No		Template - population based emissions	Solvent Documentation [4]	Population from US Census [3]	2008
2401008000	Traffic Paints	1	VOC and 4 HAPs	No		Template - emissions based on 2006 highway miles	Solvent Documentation [4]	2006 FHWA HPMS[5]	2006
2401100000	Industrial Maintenance Coatings	1	VOC and 6 HAPs	No		Template - population based emissions	Solvent Documentation [4]	Population from US Census [3]	2008
2401200000	Other Special Purpose Coatings	1	VOC and 6 HAPs	No		Template - population based emissions	Solvent Documentation [4]	Population from US Census [3]	2008
2460100000	Personal Care Products	1	VOC and 2 HAPs	No		Template - population based emissions	Solvent Documentation [4]	Population from US Census [3]	2008

SCC	Category Name	Number of SCCs	Pollutants Included	Point Source Subtraction	Category Submitted by Missouri - Calculation Method	Category Submitted by EPA - Calculation Method	Emission Factor Source	Activity for Category	Activity Base Year
2460200000	Cleaning Products: household	1	VOC and 2 HAPs	No		Template - population based emissions	Solvent Documentation [4]	Population from US Census [3]	2008
2460400000	Automotive Aftermarket	1	VOC and 2 HAPs	No		Template - population based emissions	Solvent Documentation [4]	Population from US Census [3]	2008
2460500000	Coatings and Related Products	1	VOC and 2 HAPs	No		Template - population based emissions	Solvent Documentation [4]	Population from US Census [3]	2008
2460600000	Adhesives and Sealants	1	VOC and 2 HAPs	No		Template - population based emissions	Solvent Documentation [4]	Population from US Census [3]	2008
2460800000	FIFRA Regulated Products	1	VOC and 2 HAPs	No		Template - population based emissions	Solvent Documentation [4]	Population from US Census [3]	2008

SCC	Category Name	Number of SCCs	Pollutants Included	Point Source Subtraction	Category Submitted by Missouri - Calculation Method	Category Submitted by EPA - Calculation Method	Emission Factor Source	Activity for Category	Activity Base Year
2460900000	Misc Products	1	VOC and 2 HAPs	No		Template - population based emissions	Solvent Documentation [4]	Population from US Census [3]	2008
2501050120	Bulk Terminal	1	VOC and 8 HAPs	Yes	EPA Template - point source emissions subtracted by NAICS and county		No emission factor, scaled up 1998 VOC emission from MACT analysis[8]	Scaled 1998 emissions by 2008 DOE [7]	2008
2501055120	Bulk Plants	1	VOC and 8 HAPs	Yes	EPA Template - point source emissions subtracted by NAICS and county		From Gas distribution MACT standards[8]	9% of total gasoline consumption from 2008 EIA Petroleum Navigator[10]	2008
2505040120	Petroleum Pipeline	1	VOC and 8 HAPs	No	EPA Template		No emission factor, scaled up 1998 VOC emission from MACT analysis[8]	Scaled 1998 emissions by 2008 DOE[7]	2008
2501060201	Gasoline Stage 1 Underground Storage Tanks	1	VOC and 8 HAPs	No	EPA Template		EIIP 2001 [9]	2008 NMIM county-level onroad and nonroad estimates	2008

SCC	Category Name	Number of SCCs	Pollutants Included	Point Source Subtraction	Category Submitted by Missouri - Calculation Method	Category Submitted by EPA - Calculation Method	Emission Factor Source	Activity for Category	Activity Base Year
2505030120	Gasoline Stage 1 Trucks in Transit	1	VOC and 8 HAPs	No	EPA Template		EIIP 2001 [9]	2008 NMIM county-level onroad and nonroad estimates	2008
250106005*	Gasoline Service Station Loading (submerg, splash, and balanced fill)	3	VOC and 8 HAPs	No	EPA Template		AP-42 Section 5.2[11]	2008 NMIM county-level onroad and nonroad estimates	2008
2501060100	Gasoline Distribution: Stage II	1	VOC and 8 HAPs	No	EPA Template		AP-42 Section 5.2[11]	2008 NMIM county-level onroad and nonroad estimates	2008
21040*	Residential Fuel Combustion (multiple fuel types)	16	CAPs	No		EPA Templates and Residential Wood Combustion Tool[25]	AP-42	EIA[1]	2006
2280002*	Mobile Sources - Marine Vessels - port and underway emissions	2	CAP	No		2002 estimates adjusted for 2008 activity	EPA's Office of Transportation and Air Quality (OTAQ) CAP, SEPA HAP speciation[13]	Regional growth factor for vessel activity	2002 grown to 2008

SCC	Category Name	Number of SCCs	Pollutants Included	Point Source Subtraction	Category Submitted by Missouri - Calculation Method	Category Submitted by EPA - Calculation Method	Emission Factor Source	Activity for Category	Activity Base Year
2294000000 and 2296000000	Paved and Unpaved Roads	2	PM10 FIL/PRI, PM25 FIL/PRI	No		AP-42 Equation with state or regional constants	AP-42 Section 13.2.2	2007 FHWA Highway Statistics[14]	2007
230200*	Commerical Cooking	5	CAP and HAP	No		Template - population based emissions	2002 emissions divided by population to create per captia factors	Population from US Census [3]	2008
23110*	Construction Dust (residential, industrial/commercial, roadway)	3	PM10 PRI, PM25 PRI	No		Residential activity by county used, allocate national roadway by employment	EPA documentation	Construction from Census[15] and highway construction FHWA[14]	2006 for roadway, 2008 for residential and non-residential construction,
246102*	Asphalt (cutback and emulsified)	2	CAP and HAP	No		National usage allocated to county by paved road VMT	EIIP 2001 [17]	Asphalt Institute's *2008 Asphalt Usage Survey*	2008
2501011*	Residential Portable Fuel Container	5	VOC And HAP	No		Linear fit between 2002 and 2010 emission estimates	EPA[18]	Nonroad activity from NMIM	2002 grown to 2010 with a linear fit to 2008

SCC	Category Name	Number of SCCs	Pollutants Included	Point Source Subtraction	Category Submitted by Missouri - Calculation Method	Category Submitted by EPA - Calculation Method	Emission Factor Source	Activity for Category	Activity Base Year
2501012*	Commercial Portable Fuel Container	5	VOC and HAP	No		Linear fit between 2002 and 2010 emission estimates	EPA[18]	Nonroad activity from NMIM	2002 grown to 2010 with a linear fit to 2008
2501080*	Aviation Petroleum Product use (Stage 1 and 2)	2	VOC and HAP	No		National use allocated by regions and 2008 landing and take-off activity	Four EPA documents	EIA Petroleum Annual Supply, 2008[19]	2008
26100*	Waste Disposal - Open Burning	4	VOC and HAP	No		Per capita emissions including controls	EPA documentation, EF based on 2007 report	EPA Report[20] and construction activity SCC 23110*	2008
2630020000	Waste Disposal Public Treatment	1	VOC and NH3	No		Calculate national emissions, allocate to counties by population	EPA[23,24] reports	EPA Report[22]	2004 and 2010 figures interpolated to 2008
2801700*	Fertilizer Application	14	NH3	No		Activity used in CMU Ammonia Model	CMU Ammonia Model	2002 and 2007 activity from the Fertilizer Institute[21] grown to 2008	grown 2008 figure

SCC	Category Name	Number of SCCs	Pollutants Included	Point Source Subtraction	Category Submitted by Missouri - Calculation Method	Category Submitted by EPA - Calculation Method	Emission Factor Source	Activity for Category	Activity Base Year
28050*	Animal Husbandry (by animal and manure system)	42	NH3	No		CMU Ammonia Model	CMU Ammonia Model	2007 Census of Agriculture[12]	2007

[1] EIA SEDS - Energy Information Administration - State Energy Data System http://www.eia.doe.gov/emeu/states/_seds.html

[2] Employment US Census Bureau *County Business Patterns* http://www.census.gov/epcd/cbp/download/06_data/index.html

[3] Population from US Census http://factfinder.census.gov

[4] Solvent Documentation, Table 2 and Table 3

[5] FHWA HPMS - Federal Highway Administration Highway Performance Monitoring System http://www.fhwa.dot.gov/policy/ohpi/hpms/index.cfm

[6] Huntley, Roy 2009, Criteria Pollutant Emission Factors for ICI Combustion Area Source Categories

[7] DOE - Department of Energy Energy Information Administration *Petroleum Supply Annual 2008, Volume 1,* Table 2

[8] "Gasoline Distribution Industry (Stage 1) - Background Information for Proposed Standards," EPA-453/R94-002a, OAQPS, Jan 1994 and "Gasoline Distribution Industry (Stage 1) - Background Information for Promulgated Standards," EPA-453/R94-002b, OAQPS, Nov 1994

[9] EIIP, Emission Inventory Improvement Program "Volume III: Chapter 11, Gasoline Marketing (Stage I and Stage II), Revised Final", Jan 2001

[10] EIA Energy Information Administration Petroleum Navigator - Product Supplied from http://tonto.eia.doe.gov/dnav/pet/pet_cons_psup_dc_nus_mbblpd_a.htm

[11] AP-42 Section 5.2 "Transportation and Marketing of Petroleum Liquids"

[12] 2007 Census of Agriculture, US Department of Agriculture, http://www.agcensus.usda.gov/

[13] SEPA - Swedish Environmental Protection Agency report 2004-02-02 http://westcoastcollaborative.org/files/sector-marine/SMED%20Methodology%20for%20Calculating%20Emissions%20from%20Ships.pdf

[14] Federal Highway Administration 2007 Highway Statistics http://www.fhwa.dot.gov/policyinformation/statistics/2007/.

[15] Annual Value of Construction http://www.census.gov/const/www/ototpage.html

[16] Asphalt Institute 2008 Survey http://www.asphaltinstitute.org/.

[17] EIIP, Emission Inventory Improvement Program Volume III – Area Sources, Chapter 17, "Asphalt Paving," 2001

[18] EPA Document *Estimating Emissions from Portable Fuel Containers (PFCs)* http://www.epa.gov/otaq/regs/toxics/420r07001.pdf

SCC	Category Name	Number of SCCs	Pollutants Included	Point Source Subtraction	Category Submitted by Missouri - Calculation Method	Category Submitted by EPA - Calculation Method	Emission Factor Source	Activity for Category	Activity Base Year

[19] EIA 2008 Petroleum Annual Supply, http://www.eia.doe.gov/oil_gas/petroleum/data_publications/petroleum_supply_annual/psa_volume1/psa_volume1.html

[20] EPA *Municipal Solid Waste in the United States: 2007 Facts and Figures*, EPA530-R-08-010, http://www.epa.gov/epawaste/nonhaz/municipal/pubs/msw07-rpt.pdf

[21] Assn of American Plant Food Control Officials with The Fertilizer Institute, *Commercial Fertilizers 2002 and Commercial Fertilizers 2007*, http://www.aapfco.org/aapfcopubs.html

[22] *Biosolids Generation, Use, and Disposal in the United States*, Table A-8 EPA530-R-99-009, September 1999

[23] EPA EIIP Emission Inventory Improvement Program, April 2004, *Estimating Ammonia Emissions from Anthropogenic Nonagricultural Sources – Draft Final Report*

[24] VOC Emissions from Wastewater Treatment Plants: Characterization, Control, and Compliance, Lewis Publishers, 2003, p. 261

[25] Residential Wood Combustion Tool, http://www.epa.gov/ttn/chief/net/2008inventory.html

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3.2.3 Source Category Documentation

The following documentation covers nonpoint categories that were prepared with guidance from EPA and CENRAP. The documentation files include methodologies to be applied nationally, and include Missouri-specific updates and information.

3.2.3.1 Fugitive Dust from Paved Roads

a. Source Category Description

Fugitive dust emissions from paved road traffic were estimated for PM10-PRI, PM10-FIL, PM25-PRI, and PM25-FIL. Since there are no PM-CON emissions for this category, PM10-PRI emissions are equal to PM10-FIL emissions and PM25-PRI emissions are equal to PM25-FIL.

For this source category, the following SCC was assigned:

SCC	SCC Level 1	SCC Level 2	SCC Level 3	SCC Level 4
2294000000	Mobile Sources	Paved Roads	All Paved Roads	Total: Fugitives

The table below provides a national summary of the estimated 2008 annual vehicle miles traveled (VMT) activity and emissions by pollutant. VMT from 2007 were used to estimate the VMT from 2008 which were unavailable.

2008 National Criteria Air Pollutant Emissions Summary for Fugitive Dust from Paved Roads

Pollutant Description and NIF 3.0 Pollutant Code	Emission Factor	National Activity (Million Miles)	National Emissions (Tons)
PM10-FIL	Reference 1	2,755,891	2,090,319
PM10-PRI	Reference 1	2,755,891	2,090,319
PM25-FIL	Reference 1	2,755,891	128,959
PM25-PRI	Reference 1	2,755,891	128,959

Uncontrolled paved road emissions were calculated at the State level by roadway class and month. This was done by multiplying the State/roadway class VMT by the appropriate monthly temporal allocation factor and by the paved road emission factor. After the paved road dust emissions were calculated at the State/road class/monthly level of detail, the uncontrolled emissions were then allocated to the county level using total VMT as a surrogate. Next, control factors were applied to the paved road emissions in PM_{10} nonattainment area counties. Emissions and VMT by roadway class were then totaled to the county level for reporting in the NEI. The following provides further details on the emission factor equation, temporal and spatial allocation procedures, and controls.

b. Emission Factor Equation

Reentrained road dust emissions for paved roads were estimated using paved road VMT and the emission factor equation from AP-42:[1]

$$E = [k * (sL/2)^{0.65} * (W/3)^{1.5} - C] * [1 - P/(4*N)]$$

where: E = paved road dust emission factor (gram [g]/VMT)
k = particle size multiplier (7.3 g/VMT for PM10-PRI/-FIL and 1.1 g/VMT for PM25-PRI/-FIL)
sL = road surface silt loading (g/square meter [m^2])
W = average weight (tons) of all vehicles traveling the road
C = emission factor for 1980's vehicle fleet exhaust, brake wear, and tire wear (0.2119 g/VMT for PM10-PRI/-FIL and 0.1617 g/VMT for PM 2.5-PRI/-FIL)
N = number of days in the month
P = number of days in the month with at least 0.01 inches of precipitation

The uncontrolled PM10-PRI/-FIL and PM25-PRI/-FIL emission factors are provided in attached file "Paved Roads PM Emission Factors.xls" by State, roadway class, and month.

Paved road silt loadings were assigned to each of the twelve functional roadway classes (six urban and six rural) based on the average annual traffic volume of each functional system by State.[2] The resulting paved road silt loadings calculated from the average annual traffic volume data are shown in Table 2.

The AP-42 equation listed above includes a correction factor to adjust for the number of days with measurable precipitation in each month. The factor of "4" in the precipitation adjustment accounts for the fact that paved roads dry more quickly than unpaved roads and that precipitation may not occur over the entire 24-hour day period. The number of days with at least 0.01 inches of precipitation in each month by State was obtained from the National Climatic Data Center.[3] Data were collected from a meteorological station selected to be representative of urban areas within each State. There are cases where the emission factor calculated using the equation above ends up negative due to the subtraction of the C term that accounts for vehicle exhaust, brake wear, and tire wear. In these cases, the emission factor was reset to 0, under the assumption that the emissions have been accounted for in the onroad emission inventory.

c. Activity

Total annual VMT estimates by State and roadway class were obtained from the Federal Highway Administration's (FHWA) annual Highway Statistics report.[2] Paved road VMT was calculated by subtracting the State/roadway class unpaved road VMT from total State/roadway class VMT.

d. Allocation

The paved road VMT estimates by State/roadway class were first temporally allocated by season using the National Acid Precipitation Assessment Program (NAPAP) Inventory seasonal temporal allocations factors for VMT.[4] These factors are included in the attachment "Unpaved Road county allocation fractions.xls." The seasonal VMT values were then multiplied by the ratio of the number of days in a month to the number of days in a season to adjust to monthly VMT. The emission factors were then applied to estimate emissions by month.

The paved road activity and emissions were spatially allocated to counties according to the fraction of total VMT in each county for the specific roadway class as shown by the following equation:

$$EMIS_{x,y} = EMIS_{ST,y} * VMT_{x,y} / VMT_{ST,y}$$

where: $EMIS_{x,y}$ = paved road emissions (tons) for county x and roadway class y
$EMIS_{ST,y}$ = paved road emissions (tons) for the entire State for roadway class y $VMT_{x,y}$ = total VMT (million miles) in county x and roadway class y $VMT_{ST,y}$ = total VMT (million miles) in entire State for roadway class y

The county-level VMT by roadway class developed to calculate onroad mobile source emissions was used in this equation.[5] Note that because of differences in the methodologies for calculating

total and unpaved road VMT, there are rural counties where unpaved road VMT was higher than total VMT. For these counties, unpaved VMT was reduced to total VMT and paved road VMT was assigned a value of zero.

e. Controls

Paved road dust controls were applied by county to urban and rural roads in serious PM_{10} nonattainment areas and to urban roads in moderate PM_{10} nonattainment areas. The assumed control measure is vacuum sweeping of paved roads twice per month. A control efficiency of 79 percent was assumed for this control measure.[6] The assumed rule penetration varies by roadway class and PM_{10} nonattainment area classification (serious or moderate).[6] The rule penetration rates are shown in Table 3. Rule effectiveness was assumed to be 100% for all counties where this control was applied.

Note that the controls were applied at the county/roadway class level, and the controls differ by roadway class. In the NIF 3.0 emissions table, the emissions for all roadway classes were summed to the county level. Therefore, the emissions at the county level can represent several different control, rule effectiveness, and rule penetration levels. As a result, the control efficiency, rule effectiveness, and rule penetration values were reported in the control equipment table as a composite, overall control level for each county; the rule effectiveness and rule penetration values were not reported separately in the emission table.

2008 Silt Loadings by State and Roadway Class Modeled in Paved Road Emission Factor Calculations (g/m^2)

	Rural Roadway Classes						Urban Roadway Classes					
State	Inter-State	Other Principal Arterial	Minor Arterial	Major Collector	Minor Collector	Local	Inter-state	Freeways & Express-ways	Other Principal Arterial	Minor Arterial	Collector	Local
Alabama	0.015	0.06	0.2	0.2	0.2	0.6	0.015	0.015	0.03	0.06	0.2	0.2
Alaska	0.015	0.2	0.2	0.2	0.6	0.6	0.015	0.015	0.03	0.03	0.2	0.2
Arizona	0.015	0.06	0.2	0.2	0.2	0.6	0.015	0.015	0.03	0.03	0.06	0.2
Arkansas	0.015	0.06	0.2	0.2	0.6	0.6	0.015	0.015	0.03	0.06	0.2	0.6
California	0.015	0.03	0.2	0.2	0.2	0.6	0.015	0.015	0.03	0.03	0.2	0.2
Colorado	0.015	0.06	0.2	0.2	0.6	0.6	0.015	0.015	0.03	0.06	0.2	0.2
Connecticut	0.015	0.03	0.2	0.2	0.2	0.6	0.015	0.015	0.03	0.06	0.2	0.2
Delaware	0.015	0.03	0.03	0.2	0.2	0.2	0.015	0.015	0.03	0.03	0.06	0.2
Dist. of Columbia	0.015	0.6	0.6	0.6	0.6	0.6	0.015	0.015	0.03	0.03	0.06	0.2
Florida	0.015	0.03	0.06	0.2	0.2	0.2	0.015	0.015	0.03	0.03	0.06	0.2
Georgia	0.015	0.06	0.2	0.2	0.2	0.6	0.015	0.015	0.03	0.03	0.06	0.2
Hawaii	0.015	0.03	0.06	0.2	0.2	0.2	0.015	0.015	0.03	0.03	0.06	0.2
Idaho	0.015	0.2	0.2	0.2	0.6	0.6	0.015	0.015	0.03	0.06	0.2	0.2
Illinois	0.015	0.06	0.2	0.2	0.6	0.6	0.015	0.015	0.03	0.03	0.06	0.2
Indiana	0.015	0.06	0.06	0.2	0.2	0.6	0.015	0.015	0.03	0.06	0.2	0.2
Iowa	0.015	0.2	0.2	0.2	0.6	0.6	0.015	0.015	0.03	0.06	0.2	0.2
Kansas	0.015	0.2	0.2	0.6	0.6	0.6	0.015	0.015	0.03	0.06	0.2	0.2
Kentucky	0.015	0.06	0.2	0.2	0.2	0.6	0.015	0.015	0.03	0.03	0.2	0.2
Louisiana	0.015	0.06	0.06	0.2	0.2	0.6	0.015	0.015	0.03	0.06	0.2	0.6
Maine	0.015	0.06	0.2	0.2	0.2	0.6	0.015	0.015	0.03	0.06	0.2	0.2
Maryland	0.015	0.03	0.06	0.2	0.2	0.6	0.015	0.015	0.03	0.03	0.06	0.2
Massachusetts	0.015	0.03	0.06	0.2	0.2	0.6	0.015	0.015	0.03	0.06	0.2	0.2
Michigan	0.015	0.06	0.2	0.2	0.2	0.6	0.015	0.015	0.03	0.03	0.2	0.2
Minnesota	0.015	0.06	0.2	0.2	0.6	0.6	0.015	0.015	0.03	0.06	0.2	0.2
Mississippi	0.015	0.06	0.2	0.2	0.2	0.6	0.015	0.015	0.03	0.06	0.2	0.2
Missouri	0.015	0.06	0.2	0.2	0.6	0.6	0.015	0.015	0.03	0.06	0.2	0.2
Montana	0.015	0.2	0.2	0.6	0.6	0.6	0.015	0.015	0.03	0.06	0.2	0.2
Nebraska	0.015	0.2	0.2	0.6	0.6	0.6	0.015	0.015	0.03	0.06	0.2	0.2
Nevada	0.015	0.2	0.2	0.2	0.6	0.6	0.015	0.015	0.03	0.03	0.06	0.2
New Hampshire	0.015	0.03	0.06	0.2	0.2	0.6	0.015	0.015	0.03	0.06	0.2	0.2
New Jersey	0.015	0.03	0.06	0.2	0.2	0.2	0.015	0.015	0.03	0.06	0.2	0.2
New Mexico	0.015	0.2	0.2	0.2	0.2	0.6	0.015	0.015	0.03	0.06	0.2	0.2
New York	0.015	0.06	0.2	0.2	0.2	0.6	0.015	0.015	0.03	0.03	0.06	0.2
North Carolina	0.015	0.03	0.06	0.2	0.2	0.6	0.015	0.015	0.03	0.06	0.2	0.2
North Dakota	0.015	0.2	0.2	0.6	0.6	0.6	0.015	0.015	0.03	0.2	0.2	0.2
Ohio	0.015	0.03	0.2	0.2	0.2	0.6	0.015	0.015	0.03	0.06	0.2	0.2
Oklahoma	0.015	0.06	0.2	0.2	0.6	0.6	0.015	0.015	0.03	0.06	0.2	0.2
Oregon	0.015	0.2	0.2	0.2	0.6	0.6	0.015	0.015	0.03	0.06	0.2	0.2
Pennsylvania	0.015	0.03	0.2	0.2	0.2	0.6	0.015	0.015	0.03	0.06	0.2	0.2
Rhode Island	0.015	0.03	0.06	0.2	0.2	0.6	0.015	0.015	0.03	0.06	0.2	0.6
South Carolina	0.015	0.06	0.06	0.2	0.2	0.6	0.015	0.015	0.03	0.03	0.2	0.6
South Dakota	0.015	0.2	0.2	0.6	0.6	0.6	0.015	0.015	0.03	0.06	0.2	0.6

	Rural Roadway Classes						Urban Roadway Classes					
State	Inter-State	Other Principal Arterial	Minor Arterial	Major Collector	Minor Collector	Local	Inter-state	Freeways & Express-ways	Other Principal Arterial	Minor Arterial	Collector	Local
Tennessee	0.015	0.06	0.2	0.2	0.2	0.6	0.015	0.015	0.03	0.06	0.2	0.2
Texas	0.015	0.06	0.2	0.2	0.6	0.6	0.015	0.015	0.03	0.06	0.2	0.6
Utah	0.015	0.2	0.2	0.2	0.6	0.6	0.015	0.015	0.03	0.03	0.06	0.2
Vermont	0.015	0.06	0.2	0.2	0.2	0.2	0.015	0.015	0.03	0.06	0.2	0.2
Virginia	0.015	0.03	0.2	0.2	0.2	0.6	0.015	0.015	0.03	0.03	0.2	0.2
Washington	0.015	0.06	0.2	0.2	0.6	0.6	0.015	0.015	0.03	0.06	0.2	0.2
West Virginia	0.015	0.06	0.2	0.2	0.2	0.6	0.015	0.015	0.03	0.06	0.2	0.2
Wisconsin	0.015	0.06	0.2	0.2	0.6	0.6	0.015	0.015	0.03	0.06	0.2	0.2
Wyoming	0.015	0.2	0.2	0.2	0.6	0.6	0.015	0.015	0.06	0.2	0.2	0.2

Penetration Rate of Paved Road Vacuum Sweeping

PM_{10} Nonattainment Status	Roadway Class	Vacuum Sweeping Penetration Rate
Moderate	Urban Interstate	0.42
Moderate	Urban Freeway & Expressway	0.67
Moderate	Urban Other Principal Arterial	0.90
Moderate	Urban Minor Arterial	0.67
Moderate	Urban Collector	0.64
Moderate	Urban Local	0.88
Serious	Rural Interstate	0.55
Serious	Rural Other Principal Arterial	0.37
Serious	Rural Minor Arterial	0.71
Serious	Rural Major Collector	0.83
Serious	Rural Minor Collector	0.59
Serious	Rural Local	0.35
Serious	Urban Interstate	0.42
Serious	Urban Freeway & Expressway	0.67
Serious	Urban Other Principal Arterial	0.90
Serious	Urban Minor Arterial	0.67
Serious	Urban Collector	0.64
Serious	Urban Local	0.88

f. References

1. United States Environmental Protection Agency, Office of Air Quality Planning and Standards. "Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources, Section 13.2.1, Paved Roads." Research Triangle Park, NC. 2006.

2. U.S. Department of Transportation, Federal Highway Administration. *Highway Statistics 2007.* Office of Highway Policy Information. Washington, DC. 2008. Available at http://www.fhwa.dot.gov/policyinformation/statistics/2007/.

3. U.S. Department of Commerce, National Oceanic and Atmospheric Administration. Summary of the Day Element TD-3200, 2008 data provided via FTP. National Climatic Data Center. 2009.

4. U.S. Environmental Protection Agency. "The 1985 NAPAP Emissions Inventory: Development of Temporal Allocation Factors," EPA-600/7-89-010d. Air & Energy Engineering Research Laboratory. Research Triangle Park, NC. April 1990.

5. E.H. Pechan & Associates, Inc. “Documentation for the Onroad National Emission Inventory (NEI) for Base Years 1970 - 2002,” report prepared for U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC. January 2004.

6. E.H. Pechan & Associates, Inc. “Phase II Regional Particulate Strategies; Task 4: Particulate Control Technology Characterization,” draft report prepared for U.S. Environmental Protection Agency, Office of Policy, Planning and Evaluation. Washington, DC. June 1995.

7. EPA, 2006. Western Governors' Association. 2006. Background Document for Revisions to Fine Fraction Ratios Used for AP-42 Fugitive Dust Emission Factors. Western Regional Air Partnership (WRAP), 1515 Cleveland Place, Suite 200, Denver, Colorado 80202 .

3.2.3.2 Fugitive Dust from Unpaved Roads

a. Source Category Description

Fugitive dust emissions from unpaved road traffic were estimated for PM10-PRI, PM10-FIL, PM25-PRI, and PM25-FIL. Since there are no PM-CON emissions for this category, PM10-PRI emissions are equal to PM10-FIL emissions and PM25-PRI emissions are equal to PM25-FIL.

For this source category, the following SCC was assigned:

SCC	SCC Level 1	SCC Level 2	SCC Level 3	SCC Level 4
2296000000	Mobile Sources	Unpaved Roads	All Unpaved Roads	Total: Fugitives

The table below provides a national summary of the 2008 annual VMT activity and emissions by pollutant.

2008 National Criteria Air Pollutant Emissions Summary for Fugitive Dust from Unpaved Roads

Pollutant Description and NIF 3.0 Pollutant Code	Emission Factor Reference	National Activity (Million Miles)	National Emissions (Tons)
PM10-FIL	Reference 1	41,700	8,448,784
PM10-PRI	Reference 1	41,700	8,448,784
PM25-FIL	Reference 1	41,700	841,571
PM25-PRI	Reference 1	41,700	841,571

Uncontrolled unpaved road emissions were calculated at the State level by roadway class and month. This was done by multiplying the State/roadway class unpaved roadway VMT by the appropriate monthly temporal allocation factor and by the monthly unpaved road emission factor. After the unpaved road dust emissions were calculated at the State/roadway class/monthly level of detail, the uncontrolled emissions were then allocated to the county level using 1990 rural population data as a surrogate. Next, control factors were applied to the unpaved road emissions in PM_{10} nonattainment area counties. Emissions and VMT by roadway class were then totaled to the county level for reporting in the NEI. The following provides further details on the emission factor equation, temporal and spatial allocation procedures, and controls.

b. Emission Factor Equation

Reentrained road dust emissions for unpaved roads were estimated using unpaved road VMT and the emission factor equation from AP-42:[1]

$$E = [k * (s/12)^{1} * (SPD/30)^{0.5}] /$$

$(M/0.5)^{0.2}$ **-** C where k, and C are empirical constants given in Table

2, with

k = particle size multiplier (lb/VMT)
E = size specific emission factor (lb/VMT)

s = surface material silt content (%)
SPD = mean vehicle speed (mph)
M = surface material moisture content (%)
C = emission factor for 1980's vehicle fleet exhaust, brake wear, and tire wear (lb/VMT)

The uncontrolled emission factors are provided in the attachment "Unpaved Roads PM Emission Factors.xls" by State, roadway class, and month.

Average State-level unpaved road silt content values, developed as part of the 1985 NAPAP Inventory, were obtained from the Illinois State Water Survey.[2] Silt contents of over 200 unpaved roads from over 30 States were obtained. Average silt contents of unpaved roads were calculated for each sate that had three or more samples for that State. For States that did not have three or more samples, the average for all samples from all States was used as a default value. The silt content values by State, and identifies if the values were based on a sample average or default value.

Constants for Unpaved Roads Reentrained Dust Emission Factor Equation[1]

Constant	PM25-PRI/ PM25-FIL	PM10-PRI/ PM10-FIL
k (lb/VMT)	0.18	1.8
C	0.00036	0.00047

The table below lists the speeds modeled on the unpaved roads by roadway class. These speeds were determined based on the average speeds modeled for onroad emission calculations and weighted to determine a single average speed for each of the roadway classes. The value of 0.5 percent for M was chosen as the national default as sufficient resources were not available at the time the emissions were calculated to determine more locally-specific values for this variable.

Speeds Modeled by Roadway Type on Unpaved Roads

Unpaved Roadway Type	Speed (mph)
Rural Minor Arterial	39
Rural Major Collector	34
Rural Minor Collector	30
Rural Local	30
Urban Other Principal Arterial	20
Urban Minor Arterial	20
Urban Collector	20
Urban Local	20

Correction factors were applied to the emission factors to account for the number of days with a sufficient amount of precipitation to prevent road dust resuspension. Monthly corrected emission factors by State and roadway classification were calculated using the following equation:

$$E_{corr} = E * [(D-p)/D]$$

where: E_{corr} = unpaved road dust emission factor corrected for precipitation effects
E = uncorrected emission factor
D = number of days in the month
p = number of days in the month with at least 0.01 inches of precipitation

The number of days with at least 0.01 inches of precipitation in each month was obtained from the National Climatic Data Center.[3] Data were collected from a meteorological station selected to be representative of rural areas within the State.

c. Activity

Unpaved roadway mileage estimates were obtained from the FHWA's annual Highway Statistics report.[4] Unpaved mileage data for 2007 were used, as data for 2008 were not yet available. Separate calculations of VMT were performed for county- and noncounty- (State or federally) maintained roadways. State-level, county-maintained roadway mileage was organized by surface type (rural and urban) and the average daily traffic volume (ADTV) groups shown in Table 4. From these data, State-level unpaved roadway mileage estimates were made. The following equation was then used to calculate State-level unpaved road VMT estimates:

$$VMT_{UP} = ADTV * FSRM * 366 \text{ days/year}$$

where: VMT_{UP} = VMT on unpaved roads (miles/year)
ADTV = average daily traffic volume (vehicles/day/mile) FSRM = functional system roadway mileage (miles)

State and federally maintained roadway mileage was categorized by arterial classification, not roadway traffic volume; therefore, the VMT was calculated differently than for county-maintained roadways. The ADTV was assumed to not vary by roadway maintenance responsibility, so the ADTV calculated from county-maintained VMT and mileage (ADTV = VMT / Mileage) was used with noncounty-maintained roadway mileage to calculate VMT in the above equation.

Table 4. Assumed Values for Average Daily Traffic Volume (ADTV) by Volume Group

Rural Roads				
Volume Category (vehicles per day per mile)	< 50	50-199	200-499	> 500
Assumed ADTV	5*	125**	350**	550***
Urban Roads				
Volume Category (vehicles per day per mile)	< 200	200-499	500-1999	> 2000
Assumed ADTV	20*	350**	1250**	2200***

Notes: *10% of volume group's maximum range endpoint.
** Average of volume group's range endpoints.
*** 110% of volume group's minimum range endpoint.

d. Allocation

The unpaved road VMT estimates by State/roadway class were first temporally allocated by season using the NAPAP Inventory seasonal temporal allocations factors for VMT.[5] These factors are provided in the attachment "Paved and Unpaved Road VMT temp factors.xls". The seasonal VMT values were then multiplied by the ratio of the number of days in a month to the number of days in a season to adjust to monthly VMT. The emission factors were then applied to estimate emissions by month.

The State/roadway class unpaved road emissions were then spatially allocated to each county using estimates of the ratio of 1990 county rural population to the State rural population from the U.S. Census Bureau[6] as shown by the following equation:

$$EMIS_{x,y} = (CL_x / SL) * EMIS_{,y}$$

where: $EMIS_{x,y}$ = unpaved road emissions (tons) for county x and roadway class y
CL_x = rural population in county x SL = rural population in the State $EMIS_{,y}$ = unpaved road emissions in entire State for roadway class y

The county-level allocation factors are provided in the attachment "Unpaved Road county allocation fractions.xls."

e. Controls

The controls assumed for unpaved roads varied by PM_{10} nonattainment area classification and by urban and rural areas. On urban unpaved roads in moderate PM_{10} nonattainment areas, paving of the unpaved road was assumed, and a control efficiency of 96 percent and a rule penetration of 50 percent were applied. Chemical stabilization, with a control efficiency or 75 percent and a rule penetration of 50 percent, was assumed for rural areas in serious PM_{10} nonattainment areas. A combination of paving and chemical stabilization, with a control efficiency of 90 percent and a rule penetration of 75 percent, was assumed for urban unpaved roads in serious PM_{10} nonattainment areas.[7]

Note that the controls were applied at the county/roadway class level, and the controls differ by roadway class. In the NIF 3.0 emissions table, the emissions for all roadway classes were summed to the county level. Therefore, the emissions at the county level can represent several different control, rule effectiveness, and rule penetration levels. As a result, the control efficiency, rule effectiveness, and rule penetration values were reported in the control equipment table as a composite, overall control level for each county; the rule effectiveness and rule penetration values were not reported separately in the emissions table.

f. References

1. United States Environmental Protection Agency, Office of Air Quality Planning and Standards. "Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources, Section 13.2.2, Unpaved Roads." Research Triangle Park, NC. 2003.

2. W. Barnard, G. Stensland, and D. Gatz, Illinois State Water Survey, "Evaluation of Potential Improvements in the Estimation of Unpaved Road Fugitive Emission Inventories," paper 87-58.1, presented at the 80th Annual Meeting of the APCA . New York, New York. June 21-26, 1987.

3. U.S. Department of Commerce, National Oceanic and Atmospheric Administration. Summary of the Day Element TD-3200, 2008 data provided via FTP. National Climatic Data Center, 2009.

4. U.S. Department of Transportation, Federal Highway Administration. *Highway Statistics 2007.* Office of Highway Policy Information. Washington, DC. 2009. Available at http://www.fhwa.dot.gov/policyinformation/statistics/2007/.

5. U.S. Environmental Protection Agency. "The 1985 NAPAP Emissions Inventory: Development of Temporal Allocation Factors," EPA-600/7-89-010d. Air & Energy Engineering Research Laboratory. Research Triangle Park, NC. April 1990.

6. U.S. Department of Commerce. "1990 Census of Population , Volume I Characteristics of Population," Bureau of the Census. Washington, DC. July 1992.

7. E.H. Pechan & Associates, Inc. "Phase II Regional Particulate Strategies; Task 4: Particulate Control Technology Characterization," draft report prepared for U.S. Environmental Protection Agency, Office of Policy, Planning and Evaluation. Washington, DC. June 1995.

8. EPA, 2006. Western Governors' Association. 2006. Background Document for Revisions to Fine Fraction Ratios Used for AP-42 Fugitive Dust Emission Factors. Western Regional Air Partnership (WRAP), 1515 Cleveland Place, Suite 200, Denver, Colorado 80202 .

3.2.3.3 Fossil Fuel Combustion – Residential – Coal Combustion

a. Source Category Description

Residential Coal Combustion is coal that is burned to heat residential housing.

The general approach to calculating emissions for these two SCCs is to take State Coal Consumption from the EIA and allocate it to the county level using methods described below. County-level coal consumption is multiplied by the emission factors to calculate emissions.

For this source category, the following SCCs were assigned:

SCC	Descriptor 1	Descriptor 3	Descriptor 6	Descriptor 8
2104001000	Stationary Source Fuel Combustion	Residential	Anthracite Coal	All Boiler Types
2104002000	Stationary Source Fuel Combustion	Residential	Bituminous/ Subbituminous Coal	All Boiler Types

b. Activity Data

The mass of coal consumed by residential combustion in the U.S. was used to estimate emissions. Coal consumption by energy use sector is presented in State Energy Data 2006 Consumption tables published by the Energy Information Administration (EIA).[1] Year 2006 consumption data were used as a surrogate for 2008 emissions because year 2006 data were the latest data available when this inventory was prepared.

EIA data do not distinguish between anthracite and bituminous coal consumption estimates. The EIA table "Domestic Distribution of U.S. Coal by Destination State, Consumer, Origin and Method of Transportation," provides state-level residential coal distribution data for 2006 that was used to estimate anthracite and bituminous coal consumption. The amount of anthracite distributed to each state and the total coal delivered to each state were used to estimate the proportion of anthracite and bituminous coal consumption.[2] The 2006 ratio of anthracite (and bituminous) coal consumption to total coal consumption was used to distribute the EIA's total residential sector coal consumption data by coal type. Table 1 presents the 2006 anthracite and bituminous coal ratios for each state.

State-level coal consumption was allocated to each county using the US Census Bureau's 2000 Census Detailed Housing Information.[3] These data include the number of housing units using a specific type of fuel for residential heating. State coal consumption was allocated to each county using the ratio of the number of houses burning coal in each county to the total number of houses burning coal in the State.

c. Control Factors

No controls were assumed for this category

d. Emission Factors

In some cases (see Table 2), SO_2 and PM emission factors required information on the sulfur and/or ash content of the coal burned. State-specific sulfur and ash contents of anthracite and bituminous coal were obtained from data compiled in preparing the 1999 residential coal combustion emissions estimates.[4] This study mostly relied on data obtained from USGS COALQUAL database. States not included in the database but that reported coal usage were assigned values based on their proximity to coal seams or using an average value for Pennsylvania (see report for details of the analysis). Table 3 presents the bituminous coal sulfur content values used for each state. For anthracite coal, an ash content value of 13.38% and a sulfur content of 0.89% were applied to all states except New Mexico (ash content 16.61%, sulfur content 0.77%), Washington (ash content 12%, sulfur content 0.9%), and Virginia (ash content 13.38%, sulfur content 0.43%).

The remaining criteria pollutant and HAP emissions were calculated by multiplying the total coal consumed in each county per year by an emission factor. All emission factors except ammonia are from AP-42.[5] The ammonia emission factor is from EPA's *Estimating Ammonia Emissions from Anthropogenic Sources, Draft Final Report*.[6] Table 4 presents a summary of the emission factors for residential anthracite coal combustion (SCC 2104001000). Table 5 presents a summary of the emission factors for residential bituminous coal combustion (SCC 2104002000).

e. Sample Calculations

Annual emissions are calculated for each county using emission factors and activity as:

$$E_{x,p} = FC_x \times (1 - CE_{x,p}) \times EF_{x,p}$$

where:

$E_{x,p}$ = annual emissions for fuel type x and pollutant p (ton/year),
FC_x = annual fuel consumption for fuel type x,
$CE_{x,p}$ = control efficiency for fuel type x and pollutant p, and
$EF_{x,p}$ = emission factor for fuel type x and pollutant p.

County level fuel consumption is calculated using:

$$FC_x = A_{State} \text{ x } Ratio_{Anth,\ Bit} \text{ x } Ratio_{County\ houses}$$

where:

A_{State} = total tons of coal reported by the EIA,
$Ratio_{Anth,\ Bit}$ = ratio reported in Table 1, and
$Ratio_{County\ houses}$ = county allocation ratio based on number of houses burning coal.

Example:
Using Allegheny County, PA as an example:

The State of Pennsylvania had a reported use of 49,935 tons of coal in the residential sector in 2006.

Statewide Anthracite coal use is calculated using the ratio of Anthracite to Bituminous in Table 1 for PA: 80.64%. Allegheny County, PA had 183 houses out of the state total of 67,986 that use coal as the primary heating fuel. This equates to a share of 0.27% of the coal used for residential heating in the state.

The emission factor for $PM_{2.5}$-PRI (See Table 4) is 0.6 × state-specific % ash content + 0.08 lbs/ton× state-specific % ash content. The ash content is 13.38%, (See Table 2) so the emission factor is 9.09 lbs/ton.

$FC_{Allegheny,\ anth} = 49{,}935 \times 0.8064 \times 0.0027 = 109$ tons anthracite coal

$Emis_{Allegheny,\ anth,\ PM2.5\text{-}PRI} = 109$ tons Coal × 9.09 lbs $PM_{2.5}$-PRI per ton coal
= 990 lbs $PM_{2.5}$-PRI

f. References

1. U.S. Department of Energy, Energy Information Administration (EIA). State Energy Data 2006 Consumption. Washington, DC 2008. Internet Address: http://www.eia.doe.gov/emeu/states/sep_use/total/csv/use_all_phy.csv accessed November 2008.

2. EIA, 2008. U.S. Department of Energy, Energy Information Administration, "Domestic Distribution of U.S. Coal by Destination State, Consumer, Origin and Method of Transportation", 2006. Available from: http://www.eia.doe.gov/cneaf/coal/page/coaldistrib/coal_distributions.html, accessed December 2008.

3. U.S. Census Bureau. "Table H40. House Heating Fuel Type", Census 2000: Summary File 3. Internet address: http://factfinder.census.gov/servlet/DatasetMainPageServlet?_program=DEC&_submenuId=&_lang=en&_ts=, accessed July 2009.

4. U.S. Environmental Protection Agency. Emission Factor and Inventory Group. Final Summary of the Development and Results of a Methodology for Calculating Area Source Emissions from Residential Fuel Combustion. Prepared by Pacific Environmental Services, Inc. Research Triangle Park, NC. September 2002. Internet address: http://www.epa.gov/ttn/chief/eiip/techreport/volume03/draft1999_residfuel_inven_apr2003.zip accessed November 2004.

5. U.S. Environmental Protection Agency. Compilation of Air Pollutant Emission Factors, 5th Edition, AP-42, Volume I: Stationary Point and Area Sources. Research Triangle Park, North Carolina. 1996.

6. U.S. Environmental Protection Agency. Emission Inventory Improvement Program. Estimating Ammonia Emissions from Anthropogenic Sources, Draft Final Report. Prepared by E.H. Pechan and Associates, Inc. Research Triangle Park, NC. April 2004.

Table 1. 2006 Anthracite and Bituminous Coal Distribution for the Residential and Commercial Sectors

State	Ratio of Bituminous	Ratio of Anthracite	State	Ratio of Bituminous	Ratio of Anthracite
Alabama	1.0000	0.0000	Montana	1.0000	0.0000
Alaska	1.0000	0.0000	Nebraska	1.0000	0.0000
Arizona	0.8140	0.1860	Nevada	1.0000	0.0000
Arkansas	0.8140	0.1860	New Hampshire	0.0000	1.0000
California	1.0000	0.0000	New Jersey	0.0000	1.0000
Colorado	0.9962	0.0038	New Mexico	1.0000	0.0000
Connecticut	0.0000	1.0000	New York	0.6000	0.4000
Delaware	0.8140	0.1860	North Carolina	1.0000	0.0000
Dist. Columbia	1.0000	0.0000	North Dakota	1.0000	0.0000
Florida	0.8140	0.1860	Ohio	0.8727	0.1273
Georgia	1.0000	0.0000	Oklahoma	0.9167	0.0833
Hawaii	1.0000	0.0000	Oregon	1.0000	0.0000
Idaho	0.9792	0.0208	Pennsylvania	0.1936	0.8064
Illinois	0.9981	0.0019	Rhode Island	0.0000	1.0000
Indiana	0.9474	0.0526	South Carolina	0.9972	0.0028
Iowa	0.9992	0.0008	South Dakota	1.0000	0.0000
Kansas	1.0000	0.0000	Tennessee	0.9939	0.0061
Kentucky	0.9981	0.0019	Texas	0.8140	0.1860
Louisiana	1.0000	0.0000	Utah	1.0000	0.0000
Maine	0.0000	1.0000	Vermont	0.0000	1.0000
Maryland	0.9286	0.0714	Virginia	0.9630	0.0370
Massachusetts	0.5000	0.5000	Washington	1.0000	0.0000
Michigan	0.6667	0.3333	West Virginia	0.9048	0.0952
Minnesota	0.9973	0.0027	Wisconsin	0.9914	0.0086
Mississippi	1.0000	0.0000	Wyoming	1.0000	0.0000
Missouri	1.0000	0.0000			

Table 2. SO_2 and PM Emission Factors for Industrial Anthracite and Bituminous Coal Combustion

Pollutant	Emission Factor (lb/ton)	AP-42 Table
Anthracite Emission Factors (SCC 2104001000)		
PM-CON	0.08* % Ash	1.2-3
PM10-FIL	10	1.2-4
PM25-FIL	0.6 * % Ash	1.2-4
PM10-PRI	10 + 0.08* % Ash	1.2-3 and 1.2-4
PM25-PRI	0.6 * % Ash + 0.08* % Ash	1.2-3 and 1.2-4
Sulfur Dioxide	39 * % Sulfur	1.2-1
Bituminous Emission Factors (SCC 2104002000)		

PM-CON	.04	1.1-5
PM10-FIL	6.2	1.1-9
PM25-FIL	3.8	1.1-9
PM10-PRI	6.24	1.1-5 and 1.1-9
PM25-PRI	3.84	1.1-5 and 1.1-9
Sulfur Dioxide	31 * % Sulfur	1.1-3
NOTE: PM_{10}, $PM_{2.5}$, and condensable PM emission factors for bituminous coal do not require ash content, nor does the condensable PM emission factor for anthracite coal.		

Table 3. State-Specific Sulfur Content for Bituminous Coal (SCC 2104002000)

State	Percent Sulfur Content	State	Percent Sulfur Content
Alabama	2.08	Montana	0.60
Alaska	0.31	Nebraska	2.43
Arizona	0.47	Nevada	2.30
Arkansas	1.20	New Hampshire	2.42
California	0.47	New Jersey	2.42
Colorado	0.61	New Mexico	0.75
Connecticut	2.42	New York	2.42
Delaware	1.67	North Carolina	1.62
District of Columbia	1.67	North Dakota	0.97
Florida	1.28	Ohio	3.45
Georgia	1.28	Oklahoma	3.08
Hawaii	1.00	Oregon	0.50
Idaho	0.31	Pennsylvania	2.42
Illinois	3.48	Rhode Island	2.42
Indiana	2.49	South Carolina	1.28
Iowa	4.64	South Dakota	0.97
Kansas	5.83	Tennessee	1.62
Kentucky	1.93	Texas	1.14
Louisiana	0.86	Utah	0.80
Maine	2.42	Vermont	2.42
Maryland	1.67	Virginia	1.19
Massachusetts	2.42	Washington	0.50
Michigan	1.20	West Virginia	1.25
Minnesota	0.97	Wisconsin	1.00
Mississippi	1.24	Wyoming	0.87
Missouri	3.39		

Table 4. National Criteria and HAP Emission Factors for Residential Anthracite Coal Combustion (SCC 2104001000): Not Adjusted for Point Source Fuel Consumption

SCC	Pollutant Code	Pollutant Code Description	Factor Numeric Value	Factor Unit Numerator	Factor Unit Denominator
2104001000	100414	ETHYL BENZENE	0.000094	LB	TON
2104001000	100425	STYRENE	0.000025	LB	TON
2104001000	107028	ACROLEIN	0.00029	LB	TON
2104001000	107062	ETHYLENE DICHLORIDE	0.00004	LB	TON
2104001000	108883	TOLUENE	0.00024	LB	TON
2104001000	108907	CHLOROBENZENE	0.000022	LB	TON
2104001000	108952	PHENOL	0.000016	LB	TON
2104001000	110543	HEXANE	0.000067	LB	TON
2104001000	117817	BIS(2-ETHYLHEXYL)PHTHALATE	0.000073	LB	TON
2104001000	120127	ANTHRACENE	0.00000021	LB	TON
2104001000	123386	PROPIONALDEHYDE	0.00038	LB	TON
2104001000	127184	TETRACHLOROETHYLENE	0.000043	LB	TON
2104001000	129000	PYRENE	0.00000033	LB	TON
2104001000	191242	BENZO[G,H,I,]PERYLENE	0.000000027	LB	TON
2104001000	193395	INDENO[1,2,3-C,D]PYRENE	0.000000061	LB	TON
2104001000	206440	FLUORANTHENE	0.00000071	LB	TON
2104001000	208968	ACENAPHTHYLENE	0.00000025	LB	TON
2104001000	218019	CHRYSENE	0.0000001	LB	TON
2104001000	50000	FORMALDEHYDE	0.00024	LB	TON
2104001000	50328	BENZO[A]PYRENE	0.000000038	LB	TON
2104001000	56553	BENZ[A]ANTHRACENE	0.00000008	LB	TON
2104001000	56832736	Benzofluoranthenes	0.00000011	LB	TON
2104001000	71432	BENZENE	0.0013	LB	TON
2104001000	7439921	LEAD	0.00042	LB	TON
2104001000	7439965	MANGANESE	0.00049	LB	TON
2104001000	7439976	MERCURY	0.000083	LB	TON
2104001000	7440020	NICKEL	0.00028	LB	TON
2104001000	7440360	ANTIMONY	0.000018	LB	TON
2104001000	7440382	ARSENIC	0.00041	LB	TON
2104001000	7440417	BERYLLIUM	0.000021	LB	TON
2104001000	7440439	CADMIUM	0.000051	LB	TON
2104001000	7440473	CHROMIUM	0.000264	LB	TON
2104001000	7440484	COBALT	0.0001	LB	TON
2104001000	74839	METHYL BROMIDE	0.00016	LB	TON
2104001000	74873	METHYL CHLORIDE	0.00053	LB	TON

SCC	Pollutant Code	Pollutant Code Description	Factor Numeric Value	Factor Unit Numerator	Factor Unit Denominator
2104001000	75070	ACETALDEHYDE	0.00057	LB	TON
2104001000	75092	METHYLENE CHLORIDE	0.00029	LB	TON
2104001000	75150	CARBON DISULFIDE	0.00013	LB	TON
2104001000	7647010	HYDROCHLORIC ACID	1.2	LB	TON
2104001000	7664393	HYDROGEN FLUORIDE	0.15	LB	TON
2104001000	7782492	SELENIUM	0.0013	LB	TON
2104001000	78591	ISOPHORONE	0.00058	LB	TON
2104001000	78933	METHYL ETHYL KETONE	0.00039	LB	TON
2104001000	83329	ACENAPHTHENE	0.00000051	LB	TON
2104001000	85018	PHENANTHRENE	0.0000027	LB	TON
2104001000	86737	FLUORENE	0.00000091	LB	TON
2104001000	91203	NAPHTHALENE	0.000013	LB	TON
2104001000	98862	ACETOPHENONE	0.000015	LB	TON
2104001000	CO	CARBON MONOXIDE	275	LB	TON
2104001000	NH3	AMMONIA	2	LB	TON
2104001000	NOX	NITROGEN OXIDES	3	LB	TON
2104001000	VOC	VOLATILE ORGANIC COMPOUNDS	10	LB	TON

Table 5. National Criteria and HAP Emission Factors for Residential Bituminous Coal Combustion (SCC 2104002000): Not Adjusted for Point Source Fuel Consumption

SCC	Pollutant Code	Pollutant Code Description	Factor Numeric Value	Factor Unit Numerator	Factor Unit Denominator
2104002000	100414	ETHYL BENZENE	0.000094	LB	TON
2104002000	100425	STYRENE	0.000025	LB	TON
2104002000	107028	ACROLEIN	0.00029	LB	TON
2104002000	107062	ETHYLENE DICHLORIDE	0.00004	LB	TON
2104002000	108883	TOLUENE	0.00024	LB	TON
2104002000	108907	CHLOROBENZENE	0.000022	LB	TON
2104002000	108952	PHENOL	0.000016	LB	TON
2104002000	110543	HEXANE	0.000067	LB	TON
2104002000	117817	BIS(2-ETHYLHEXYL)PHTHALATE	0.000073	LB	TON
2104002000	123386	PROPIONALDEHYDE	0.00038	LB	TON
2104002000	127184	TETRACHLOROETHYLENE	0.000043	LB	TON
2104002000	129000	PYRENE	0.00000033	LB	TON
2104002000	191242	BENZO[G,H,I,]PERYLENE	0.000000027	LB	TON

SCC	Pollutant Code	Pollutant Code Description	Factor Numeric Value	Factor Unit Numerator	Factor Unit Denominator
2104002000	193395	INDENO[1,2,3-C,D]PYRENE	0.000000061	LB	TON
2104002000	205992	BENZO[B]FLUORANTHENE	0.00000011	LB	TON
2104002000	218019	CHRYSENE	0.0000001	LB	TON
2104002000	50000	FORMALDEHYDE	0.00024	LB	TON
2104002000	56553	BENZ[A]ANTHRACENE	0.00000008	LB	TON
2104002000	71432	BENZENE	0.0013	LB	TON
2104002000	7439921	LEAD	0.00042	LB	TON
2104002000	7439965	MANGANESE	0.00049	LB	TON
2104002000	7439976	MERCURY	0.000083	LB	TON
2104002000	7440020	NICKEL	0.00028	LB	TON
2104002000	7440360	ANTIMONY	0.000018	LB	TON
2104002000	7440382	ARSENIC	0.00041	LB	TON
2104002000	7440417	BERYLLIUM	0.000021	LB	TON
2104002000	7440439	CADMIUM	0.000051	LB	TON
2104002000	7440473	CHROMIUM	0.00026	LB	TON
2104002000	7440484	COBALT	0.0001	LB	TON
2104002000	74839	METHYL BROMIDE	0.00016	LB	TON
2104002000	74873	METHYL CHLORIDE	0.00053	LB	TON
2104002000	75070	ACETALDEHYDE	0.00057	LB	TON
2104002000	75092	METHYLENE CHLORIDE	0.00029	LB	TON
2104002000	75150	CARBON DISULFIDE	0.00013	LB	TON
2104002000	7782492	SELENIUM	0.0013	LB	TON
2104002000	78591	ISOPHORONE	0.00058	LB	TON
2104002000	78933	METHYL ETHYL KETONE	0.00039	LB	TON
2104002000	98862	ACETOPHENONE	0.000015	LB	TON
2104002000	CO	CARBON MONOXIDE	275	LB	TON
2104002000	NH3	AMMONIA	2.0	LB	TON
2104002000	NOX	NITROGEN OXIDES	9.1	LB	TON
2104002000	VOC	VOLATILE ORGANIC COMPOUNDS	10	LB	TON

3.2.3.4 Fossil Fuel Combustion – Residential – Distillate Oil

a. Source Category Description

Residential Distillate Oil Combustion is oil that is burned in residential housing

The general approach to calculating emissions for this SCC is to take State Distillate Oil Consumption from the EIA and allocate it out to the county level using methods described below. County-level oil consumption is multiplied by the emission factors to calculate emissions.

For this source category, the following SCCs were assigned:

SCC	Descriptor 1	Descriptor 3	Descriptor 6	Descriptor 8
2104004000	Stationary Source Fuel Combustion	Residential	Distillate Oil	Total Boilers and IC Engines

b. Activity Data

The state-level volume of distillate oil consumed by residential combustion in the U.S. was used to estimate emissions. Distillate oil consumption by energy use sector is presented in State Energy Data 2006 Consumption tables published by the Energy Information Administration (EIA).[1] Year 2006 consumption data were used as a surrogate for 2008 emissions because year 2006 data were the latest data available when this inventory was prepared.

State-level distillate oil consumption was allocated to each county using the US Census Bureau's 2000 Census Detailed Housing Information.[2] These data include the number of housing units using a specific type of fuel for residential heating. State distillate oil consumption was allocated to each county using the ratio of the number of houses burning distillate oil in each county to the total number of houses burning distillate oil in the State.

c. Control Factors

No control measures are assumed for this category.

d. Emission Factors

Criteria pollutant emission factors for distillate oil are from AP-42.[3] For all counties in the United States, the distillate oil consumed by commercial/institutional combustion is assumed to be No. 2 fuel oil with a heating value of 140,000 Btu per gallon and a sulfur content of 0.30%.[4] Dioxin/furan and HAP emission factors are from "Documentation of Emissions Estimation methods for Year 2000 and 2001 Mobile Source and Nonpoint Source Dioxin Inventories"[5] and "Documentation for the 1999 Base Year Nonpoint Area Source National Emission Inventory for Hazardous Air Pollutants,"[6] respectively. Sulfur content was 0.30% and was obtained from data compiled in preparing the 1999 residential coal combustion emissions estimates.[7] The ammonia emission factor is from EPA's *Estimating Ammonia Emissions from Anthropogenic Sources, Draft Report*.[8]

e. Sample Calculations

Emissions are calculated for each county using emission factors and activity as:

$$E_{x,p} = FC_x \times EF_{x,p}$$

where:

$E_{x,p}$ = annual emissions for fuel type x and pollutant p
FC_x = annual fuel consumption for fuel type x
$EF_{x,p}$ = emission factor for fuel type x and pollutant p

And $FC_x = A_{State} \text{ x } (H_{county} / H_{State})$

where :

A_{State} = State activity data from EIA
H_{County} = number of houses in the county using distillate oil as the primary heating fuel
H_{State} = number of houses in the state using distillate oil as the primary heating fuel

Example:

Using Allegheny County, PA as an example:

The State of Pennsylvania had a reported use of 16,902 thousand barrels of distillate oil in the residential sector in 2006. Allegheny County, PA had 8,123 houses out of the state total of 1,217,155 that use distillate oil as the primary heating fuel. This equates to a share of 0.67% of the distillate oil used for residential heating in the state. From Table 5, the emission factor for CO is 5 lb/thousand gallons. Because the emission factor is in lbs/thousand gallons, a conversion factor of 42 gallons per barrel is applied.

$A_{Alegheny}$ = 16,902 thousand barrels × 8,123 houses / 1,217,155 houses)
× 42 gal / barrel
= 4,737.6 thousand gallons

$Emis_{Alegheny, CO}$ = = 4,737.6 thousand gallons × 5 lb CO/ thousand gallons

= 23,688 lbs CO or 11.8 tons CO

f. References

1. U.S. Department of Energy, Energy Information Administration (EIA). State Energy Data 2006 Consumption. Washington, DC 2008. Internet Address: http://www.eia.doe.gov/emeu/states/sep_use/total/csv/use_all_phy.csv, accessed November 2008.

2. U.S. Census Bureau. "Table H40. House Heating Fuel Type", Census 2000: Summary File 3. Internet address: http://factfinder.census.gov/servlet/DatasetMainPageServlet?_program=DEC&_submenuId=&_lang=en&_ts=, accessed July 2009.

3. U.S. Environmental Protection Agency. Compilation of Air Pollutant Emission Factors, 5th Edition, AP-42, Volume I: Stationary Point and Area Sources. Research Triangle Park, North Carolina. 1996.

4. U.S. Environmental Protection Agency. Emission Factor and Inventory Group. Final Summary of the Development and Results of a Methodology for Calculating Area Source Emissions from Residential Fuel Combustion. Prepared by Pacific Environmental Services, Inc. Research Triangle Park, NC. September 2002. Internet address: http://www.epa.gov/ttn/chief/eiip/techreport/volume03/draft1999_residfuel_inven_apr2003.zip accessed November 2004.

5. U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards. "Documentation of Emissions Estimation methods for Year 2000 and 2001 Mobile Source and Nonpoint Source Dioxin Inventories." Prepared by E.H. Pechan & Associates, Inc., Durham, NC. May 2003.

6. U.S. Environmental Protection Agency, Emission Factors and Inventory Group. "Documentation for the 1999 Base Year Nonpoint Area Source National Emission Inventory for Hazardous Air Pollutants." Prepared by Eastern Research Group, Inc. Morrisville, NC. September 2002.

7. U.S. Environmental Protection Agency. Emission Factor and Inventory Group. Final Summary of the Development and Results of a Methodology for Calculating Area Source Emissions from Residential Fuel Combustion. Prepared by Pacific Environmental Services, Inc. Research Triangle Park, NC. September 2002. Internet address: http://www.epa.gov/ttn/chief/eiip/techreport/volume03/draft1999_residfuel_inven_apr2003.zip accessed November 2004.

8. U.S. Environmental Protection Agency. Emission Factor and Inventory Group. Estimating Ammonia Emissions from Anthropogenic Sources, Draft Report. Prepared by E.H. Pechan and Associates, Inc. Research Triangle Park, NC. September 2003.

Table 1. National Emission Factors for Residential Distillate Oil Combustion

Code	Pollutant	Emission Factor	Emission Factor Numerator	Emission Factor Denominator
102	Benzo[B+K]Fluoranthene	1.54517E-06	LB	E3GAL
120127	Anthracene	1.22209E-06	LB	E3GAL
129000	Pyrene	4.2141E-06	LB	E3GAL
1746016	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	4.6592E-10	LB	E3GAL
191242	Benzo[G,H,I,]Perylene	2.24752E-06	LB	E3GAL
193395	Indeno[1,2,3-C,D]Pyrene	2.10705E-06	LB	E3GAL
206440	Fluoranthene	4.91645E-06	LB	E3GAL
208968	Acenaphthylene	2.52846E-07	LB	E3GAL
218019	Chrysene	2.38799E-06	LB	E3GAL
30402154	Total Pentachlorodibenzofuran	3.4944E-09	LB	E3GAL
3268879	Octachlorodibenzo-P-Dioxin	5.4912E-10	LB	E3GAL
36088229	Total Pentachlorodibenzo-P-Dioxin	6.8224E-10	LB	E3GAL
37871004	Total Heptachlorodibenzo-P-Dioxin	5.2416E-10	LB	E3GAL
38998753	Total Heptachlorodibenzofuran	6.0736E-10	LB	E3GAL
39001020	Octachlorodibenzofuran	2.496E-10	LB	E3GAL
50000	Formaldehyde	0.0337128	LB	E3GAL
51207319	2,3,7,8-Tetrachlorodibenzofuran	4.4096E-10	LB	E3GAL
53703	Dibenzo[A,H]Anthracene	1.68564E-06	LB	E3GAL
55684941	Total Hexachlorodibenzofuran	1.4144E-09	LB	E3GAL
56553	Benz[A]Anthracene	4.07363E-06	LB	E3GAL
622	Hexachlorodibenzo-P-Dioxins, Total	5.4912E-10	LB	E3GAL
71432	Benzene	0.000210705	LB	E3GAL
7439921	Lead	0.00126423	LB	E3GAL
7439965	Manganese	0.00084282	LB	E3GAL
7439976	Mercury	0.00042141	LB	E3GAL
7440020	Nickel	0.00042141	LB	E3GAL
7440382	Arsenic	0.00056188	LB	E3GAL
7440417	Beryllium	0.00042141	LB	E3GAL
7440439	Cadmium	0.00042141	LB	E3GAL

Code	Pollutant	Emission Factor	Emission Factor Numerator	Emission Factor Denominator
7440473	Chromium	0.00042141	LB	E3GAL
75070	Acetaldehyde	0.00491645	LB	E3GAL
7782492	Selenium	0.00210705	LB	E3GAL
83329	Acenaphthene	2.10705E-05	LB	E3GAL
85018	Phenanthrene	1.05353E-05	LB	E3GAL
86737	Fluorene	4.49504E-06	LB	E3GAL
91203	Naphthalene	0.001137807	LB	E3GAL
NH3	Ammonia	1.0	LB	E3GAL
CO	Carbon Monoxide	5	LB	E3GAL
NOX	Nitrogen Oxides	18	LB	E3GAL
PM10-FIL	Primary PM10, Filterable Portion Only	1.08	LB	E3GAL
PM25-FIL	Primary PM2.5, Filterable Portion Only	0.83	LB	E3GAL
PM-CON	Primary PM Condensible Portion Only (All Less Than 1 Micron)	1.3	LB	E3GAL
SO2	Sulfur Dioxide	42.6	LB	E3GAL
VOC	Volatile Organic Compounds	0.7	LB	E3GAL
102	Benzo[B+K]Fluoranthene	1.54517E-06	LB	E3GAL
120127	Anthracene	1.22209E-06	LB	E3GAL
129000	Pyrene	4.2141E-06	LB	E3GAL
1746016	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	4.6592E-10	LB	E3GAL
191242	Benzo[G,H,I,]Perylene	2.24752E-06	LB	E3GAL
193395	Indeno[1,2,3-C,D]Pyrene	2.10705E-06	LB	E3GAL
206440	Fluoranthene	4.91645E-06	LB	E3GAL
208968	Acenaphthylene	2.52846E-07	LB	E3GAL
218019	Chrysene	2.38799E-06	LB	E3GAL
30402154	Total Pentachlorodibenzofuran	3.4944E-09	LB	E3GAL

3.2.3.5 Fossil Fuel Combustion – Residential - Kerosene

a. Source Category Description

Residential Kerosene Combustion is kerosene that is burned in residential housing. Common uses of energy associated with this sector include space heating, water heating, cooking, and running a wide variety of other equipment.

The general approach to calculating emissions for this SCC is to take State Kerosene Consumption from the EIA and allocate it to the county level using methods described below. County-level kerosene consumption is multiplied by the emission factors to calculate emissions.

For this source category, the following SCC was assigned:

SCC	Descriptor 1	Descriptor 3	Descriptor 6	Descriptor 8
2104011000	Stationary Source Fuel Combustion	Residential	Kerosene	Total: All Combustor Types

b. Activity Data

The volume of kerosene consumed by residential combustion in the U.S. was used to estimate emissions. Kerosene consumption by energy use sector is presented in State Energy Data 2006 Consumption tables published by the Energy Information Administration (EIA).[1] Year 2006 consumption data were used as a surrogate for 2008 emissions because year 2006 data were the latest data available when this inventory was prepared.

State-level kerosene consumption was allocated to each county using the US Census Bureau's 2000 Census Detailed Housing Information.[2] These data include the number of housing units using a specific type of fuel for residential heating. State kerosene consumption was allocated to each county using the ratio of the number of houses burning kerosene in each county to the total number of houses burning kerosene in the State.

c. Control Factors

No control measures are assumed for this category.

d. Emission Factors

Emission factors for distillate oil were used for kerosene, but the distillate oil emission factors were multiplied by a factor of 135/140 to convert them for this use. This factor is based on the ratio of the heat content of kerosene (135,000 Btu/gallon) to the heat content of distillate oil (140,000 Btu/gallon).[3] Criteria pollutant emission factors are from AP-42.[4] Dioxin/furan and HAP emission factors are from "Documentation of Emissions Estimation methods for Year 2000 and 2001 Mobile Source and Nonpoint Source Dioxin Inventories"[5] and "Documentation for the 1999 Base Year Nonpoint Area Source National Emission Inventory for Hazardous Air Pollutants,"[6] respectively. Distillate sulfur content (0.30%) was used for kerosene as well.[7]

e. Sample Calculations

Emissions are calculated for each county using emission factors and activity as:

$$E_{x,p} = FC_x \times EF_{x,p}$$

where:

$E_{x,p}$ = annual emissions for fuel type x and pollutant p,
FC_x = annual fuel consumption for fuel type x,
$EF_{x,p}$ = emission factor for fuel type x and pollutant p,

And $FC_x = A_{State} \times (H_{county} / H_{State})$

where :

A_{State} = State activity data from EIA
H_{County} = number of houses in the county using kerosene as the primary heating fuel
H_{State} = number of houses in the state using kerosene as the primary heating fuel

Example:
Using Allegheny County, PA as an example:

The State of Pennsylvania had a reported use of 1,419.7 thousand barrels of kerosene in the residential sector in 2006. Allegheny County, PA had 8,123 houses out of the state total of 1,217,155 that used kerosene as the primary heating fuel. This equates to a share of 0.67% of the kerosene used for residential heating in the state. From Table 1, CO Emission factor is 202.5 lb/thousand barrels.

E_{CO} = 1,419.7 thousand barrels × (8,123 houses / 1,217,155 houses)
× 202.5 lb/thousand barrels
= 1,918.6 lbs CO or 0.96 tons CO

f. References

1. U.S. Department of Energy, Energy Information Administration (EIA). State Energy Data 2006 Consumption. Washington, DC 2008. Internet address: http://www.eia.doe.gov/emeu/states/sep_use/total/csv/use_all_phy.csv, accessed November 2008.

2. U.S. Census Bureau. "Table H40. House Heating Fuel Type", Census 2000: Summary File 3. Internet address: http://factfinder.census.gov/servlet/DatasetMainPageServlet?_program=DEC&_submenuId=&_lang=en&_ts=, accessed July 2009.

3. U.S. Environmental Protection Agency. Compilation of Air Pollutant Emission Factors, 5th Edition, AP-42, Volume I: Stationary Point and Area Sources. Research Triangle Park, North Carolina. 1996.

4. U.S. Environmental Protection Agency. Emission Factor and Inventory Group. Final Summary of the Development and Results of a Methodology for Calculating Area Source Emissions from Residential Fuel Combustion. Prepared by Pacific Environmental Services, Inc. Research Triangle Park, NC. September 2002. Internet address: http://www.epa.gov/ttn/chief/eiip/techreport/volume03/draft1999_ residfuel_inven_apr2003.zip accessed November 2004.

5. U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards. "Documentation of Emissions Estimation methods for Year 2000 and 2001 Mobile Source and Nonpoint Source Dioxin Inventories." Prepared by E.H. Pechan & Associates, Inc., Durham, NC. May 2003.

6. U.S. Environmental Protection Agency, Emission Factors and Inventory Group. "Documentation for the 1999 Base Year Nonpoint Area Source National Emission Inventory for Hazardous Air Pollutants." Prepared by Eastern Research Group, Inc. Morrisville, NC. September 2002.

7. U.S. Environmental Protection Agency. Emission Factor and Inventory Group. Final Summary of the Development and Results of a Methodology for Calculating Area Source Emissions from Residential Fuel Combustion. Prepared by Pacific Environmental Services, Inc. Research Triangle Park, NC. September 2002. Internet address: http://www.epa.gov/ttn/chief/eiip/techreport/volume03/draft1999_ residfuel_inven_apr2003.zip, accessed November 2004.

Table 1. National Emission Factors for Residential Kerosene Combustion

Pollutant Code	Pollutant Code Description	Factor Numeric Value	Factor Unit Numerator	Factor Unit Denominator
102	BENZO[B+K]FLUORANTHENE	6.2579E-05	LB	E3BBL
120127	ANTHRACENE	4.9495E-05	LB	E3BBL
129000	PYRENE	0.00017067	LB	E3BBL
1746016	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	1.887E-08	LB	E3BBL
191242	BENZO[G,H,I,]PERYLENE	9.1025E-05	LB	E3BBL
193395	INDENO[1,2,3-C,D]PYRENE	8.5336E-05	LB	E3BBL
206440	FLUORANTHENE	0.00019912	LB	E3BBL
208968	ACENAPHTHYLENE	1.024E-05	LB	E3BBL
218019	CHRYSENE	9.6714E-05	LB	E3BBL
30402154	TOTAL PENTACHLORODIBENZOFURAN	1.4152E-07	LB	E3BBL
3268879	OCTACHLORODIBENZO-P-DIOXIN	2.2239E-08	LB	E3BBL
36088229	TOTAL PENTACHLORODIBENZO-P-DIOXIN	2.7631E-08	LB	E3BBL
37871004	TOTAL HEPTACHLORODIBENZO-P-DIOXIN	2.1228E-08	LB	E3BBL
38998753	TOTAL HEPTACHLORODIBENZOFURAN	2.4598E-08	LB	E3BBL
39001020	OCTACHLORODIBENZOFURAN	1.0109E-08	LB	E3BBL
50000	FORMALDEHYDE	1.3653684	LB	E3BBL
51207319	2,3,7,8-TETRACHLORODIBENZOFURAN	1.7859E-08	LB	E3BBL
53703	DIBENZO[A,H]ANTHRACENE	6.8268E-05	LB	E3BBL
55684941	TOTAL HEXACHLORODIBENZOFURAN	5.7283E-08	LB	E3BBL
56553	BENZ[A]ANTHRACENE	0.00016498	LB	E3BBL
622	HEXACHLORODIBENZO-P-DIOXINS, TOTAL	2.2239E-08	LB	E3BBL
71432	BENZENE	0.00853355	LB	E3BBL
7439921	LEAD	0.05120132	LB	E3BBL
7439965	MANGANESE	0.03413421	LB	E3BBL
7439976	MERCURY	0.01706711	LB	E3BBL
7440020	NICKEL	0.01706711	LB	E3BBL
7440382	ARSENIC	0.02275614	LB	E3BBL
7440417	BERYLLIUM	0.01706711	LB	E3BBL
7440439	CADMIUM	0.01706711	LB	E3BBL
7440473	CHROMIUM	0.01706711	LB	E3BBL
75070	ACETALDEHYDE	0.19911623	LB	E3BBL
7782492	SELENIUM	0.08533553	LB	E3BBL
83329	ACENAPHTHENE	0.00085336	LB	E3BBL
85018	PHENANTHRENE	0.00042668	LB	E3BBL
86737	FLUORENE	0.00018205	LB	E3BBL

Pollutant Code	Pollutant Code Description	Factor Numeric Value	Factor Unit Numerator	Factor Unit Denominator
91203	NAPHTHALENE	0.04608118	LB	E3BBL
NH3	AMMONIA	40.5	LB	E3BBL
CO	CARBON MONOXIDE	202.5	LB	E3BBL
NOX	NITROGEN OXIDES	729	LB	E3BBL
PM10-FIL	PRIMARY PM10, FILTERABLE PORTION ONLY	43.74	LB	E3BBL
PM25-FIL	PRIMARY PM2.5, FILTERABLE PORTION ONLY	33.615	LB	E3BBL
PM-CON	PRIMARY PM CONDENSIBLE PORTION ONLY (ALL LESS THAN 1 MICRON)	52.65	LB	E3BBL
SO2	SULFUR DIOXIDE	1,725.3	LB	E3BBL
VOC	VOLATILE ORGANIC COMPOUNDS	28.35	LB	E3BBL

3.2.3.6 Fossil Fuel Combustion – Residential – Natural Gas

a. Source Category Description

Residential Natural Gas Combustion is natural gas that is burned to heat residential housing as well as in grills, hot water heaters, and dryers.

The general approach to calculating emissions for this SCC is to take State Natural Gas Consumption from the EIA and allocate it to the county level using the methods described below. County level natural gas consumption is multiplied by the emission factors to calculate emissions.

For this source category, the following SCC was assigned:

SCC	Descriptor 1	Descriptor 3	Descriptor 6	Descriptor 8
2104006000	Stationary Source Fuel Combustion	Residential	Natural Gas	Total: Boilers and IC Engines

b. Activity Data

The state-level volume of natural gas consumed by residential combustion in the United States was used to estimate emissions. Natural gas consumption by energy use sector was obtained from the State Energy Data 2006 Consumption tables published by the EIA.[1] Year 2006 consumption data were used as a surrogate for 2008 emissions because these data were the latest data available when this inventory was prepared.

State-level natural gas consumption was allocated to each county using the US Census Bureau's 2000 Census Detailed Housing Information.[2] These data include the number of housing units using a specific type of fuel for residential heating. State natural gas consumption was allocated to each county using the ratio of the number of houses burning natural gas in each county to the total number of houses burning natural gas in the State.

c. Control Factors

No control measures are assumed for this category.

d. Emission Factors

Criteria pollutant emission factors for natural gas are from AP-42.[3] The ammonia emission factor is from EPA's *Estimating Ammonia Emissions from Anthropogenic Sources, Draft Final Report*.[4] HAP emission factors are from AP-42 and "Documentation for the 1999 Base Year Nonpoint Area Source National Emission Inventory for Hazardous Air Pollutants."[5] According to AP-42 (maximum value provided)[2], natural gas has a heat content of 1,050 million BTU per million cubic feet. This value was required to convert those emission factors originally given in units "pounds per million Btu" to units "pounds per million cubic feet." The grains of sulfur per million cubic feet are assumed to be 2000.[6] Some emission factors were revised based on recommendations by an ERTAC advisory panel composed of state and EPA personnel.

County-level criteria pollutant and HAP emissions were calculated by multiplying the total natural gas consumed in each county per year by an emission factor. Table 1 provides a summary of the pollutants, pollutant codes, and emissions factors for residential combustion of natural gas.

e. Sample Calculations

Emissions are calculated for each county using emission factors and activity as:

$$E_{x,p} = FC_x \times EF_{x,p}$$

where:

$E_{x,p}$ = annual emissions for fuel type x and pollutant p,
FC_x = annual fuel consumption for fuel type x,
$EF_{x,p}$ = emission factor for fuel type x and pollutant p,

And $FC_x = A_{State} \text{ x } (H_{county} / H_{State})$

where :

A_{State} = State activity data from EIA
H_{County} = number of houses in the county using natural gas as the primary heating fuel
H_{State} = number of houses in the state using natural gas as the primary heating fuel

Example:
Using Allegheny County, PA as an example:

The State of Pennsylvania had a reported use of 205,812 million cubic feet of natural gas in the residential sector in 2006. Allegheny County, PA had 474,292 houses out of the state total of 2,452,941 that use natural gas as the primary heating fuel. This equates to a share of 19.34% of the natural gas used for residential heating in the state. From Table 1, CO emission factor is 40 lb/million ft^3.

E_{CO}= 205,812 million ft^3 × (474,292 houses / 2,452,941 houses) × 40 lb CO/ million ft^3

= 1,591,803 lb CO or 795.9 ton CO

f. References

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2. U.S. Census Bureau. "Table H40. House Heating Fuel Type", Census 2000: Summary File 3. Internet address:

http://factfinder.census.gov/servlet/DatasetMainPageServlet?_program=DEC&_submenuId=&_lang=en&_ts=, accessed July 2009.

3. U.S. Environmental Protection Agency. Compilation of Air Pollutant Emission Factors, 5th Edition, AP-42, Volume I: Stationary Point and Area Sources. Research Triangle Park, North Carolina. 1996.

4. U.S. Environmental Protection Agency. Emission Inventory Improvement Program. Estimating Ammonia Emissions from Anthropogenic Sources, Draft Final Report. Prepared by E.H. Pechan and Associates, Inc. Research Triangle Park, NC. April 2004.

5. U.S. Environmental Protection Agency, Emission Factors and Inventory Group. "Documentation for the 1999 Base Year Nonpoint Area Source National Emission Inventory for Hazardous Air Pollutants." Prepared by Eastern Research Group, Inc. Morrisville, NC. September 2002.

6. U.S. Environmental Protection Agency. Emission Factor and Inventory Group. Final Summary of the Development and Results of a Methodology for Calculating Area Source Emissions from Residential Fuel Combustion. Prepared by Pacific Environmental Services, Inc. Research Triangle Park, NC. September 2002. Internet address: http://www.epa.gov/ttn/chief/eiip/techreport/volume03/draft1999_ residfuel_inven_apr2003.zip, accessed November 2004.

Table 1. National Criteria Pollutant and HAP Emission Factors for Residential Natural Gas Combustion

Pollutant Code	Pollutant Code Description	Factor Numeric Value	Factor Unit Numerator	Factor Unit Denominator
129000	PYRENE	0.00000525	LB	E6FT3
206440	FLUORANTHENE	0.00000315	LB	E6FT3
50000	FORMALDEHYDE	0.07875	LB	E6FT3
71432	BENZENE	0.002205	LB	E6FT3
75070	ACETALDEHYDE	0.00001365	LB	E6FT3
85018	PHENANTHRENE	0.00001785	LB	E6FT3
86737	FLUORENE	0.00000294	LB	E6FT3
91203	NAPHTHALENE	0.0006405	LB	E6FT3
CO	CARBON MONOXIDE	40	LB	E6FT3
NH3	AMMONIA	20	LB	E6FT3
NOX	NITROGEN OXIDES	94	LB	E6FT3
PM10-FIL	PRIMARY PM10, FILTERABLE PORTION ONLY	0. 2	LB	E6FT3
PM25-FIL	PRIMARY PM2.5, FILTERABLE PORTION ONLY	0.11	LB	E6FT3

Pollutant Code	Pollutant Code Description	Factor Numeric Value	Factor Unit Numerator	Factor Unit Denominator
PM-CON	PRIMARY PM CONDENSIBLE PORTION ONLY	0.32	LB	E6FT3
SO2	SULFUR DIOXIDE	0.6	LB	E6FT3
VOC	VOLATILE ORGANIC COMPOUNDS	5.5	LB	E6FT3

3.2.3.7 Non-Residential Construction

a. Source Category Description

Emissions from non-residential construction activity are a function of the acreage disturbed for non-residential construction.
For this source category, the following SCC was assigned:

Source Classification Code	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four
2311020000	Industrial Processes	Construction: SIC 15 - 17	Heavy Construction	Total

b. Activity Data

Annual Value of Construction Put in Place in the U.S[1] has the 2008 National Value of Non-residential construction. The national value of non-residential construction put in place (in millions of dollars) was allocated to counties using county-level non-residential construction (NAICS Code 2362) employment data obtained from County Business Patterns[2] (CBP). Because some counties employment data was withheld due to privacy concerns, the following procedure was adopted:
State totals for the known county level employees was subtracted from the number of employees reported in the state level version of CBP. This results in the total number of withheld employees in the state.
A starting guess of the midpoint of the range code was used (so for instance in the 1-19 employees range, a guess of 10 employees would be used) and a state total of the withheld counties was computed.
A ratio of guessed employees (Step 2) to withheld employees (Step 1) was then used to adjust the county level guesses up or down so the state total of adjusted guesses should match state total of withheld employees (Step 1)
In 1999 a figure of 2 acres/10^6 was developed. The Bureau of Labor Statistics Producer Price Index[3] lists costs of the construction industry from 1999-2007.
2007 acres per 10^6 = 1999 acres per 10^6 x (1999 PPI / 2007 PPI)
=2 acres/10^6 (132.9 / 204.3)
= 1.301 acres per 10^6

c. Emission Factors

Initial PM_{10} emissions from construction of non-residential buildings are calculated using an emission factor of 0.19 tons/acre/month. The duration of construction activity for non-residential construction is assumed to be 11 months.
Regional variances in construction emissions are corrected using soil moisture level and silt content. These correction parameters are applied to initial PM_{10} emissions from non-residential construction to develop the final emissions inventory.

To account for the soil moisture level, the PM_{10} emissions are weighted using the 30-year average precipitation-evaporation (PE) values from Thornthwaite's PE Index. Average precipitation evaporation values for each State were estimated based on PE values for specific climatic divisions within a State. These values range from 7 to 41.
To account for the silt content, thePM_{10} emissions are weighted using average silt content for each county. A data base containing county-level dry silt values was complied. These values were derived by applying a correction factor developed by the California Air Resources Board to convert wet silt values to dry silt values.[7]
The equation for PM_{10} emissions corrected for soil moisture and silt content is:

$$Corrected\ E_{PM10} = Initial\ \mathrm{E}_{PM10} \times \frac{24}{PE} \times \frac{S}{9\%}$$

where: Corrected E_{PM10} = PM_{10} emissions corrected for soil moisture and silt content,
PE = precipitation-evaporation value for each State,
S = % dry silt content in soil for area being inventoried.
Once PM_{10} adjustments have been made, PM_{25} emissions are set to 10% of PM_{10}

d. Control Factors

No control measures are assumed for this category.

e. Example Calculation

$Emissions_{PM10} = N_{Spending}$ x $(Emp_{county} / Emp_{National})$ x Apd x EF_{Adj}
Where $N_{Spending}$ = National spending
Emp_{county} = county level employment data
$Emp_{National}$ = National level employment data
Apd = Acres per million dollars
EF_{Adj} = Adjusted PM10 emission factor

f. References

Annual Value of Construction Put in Place: http://www.census.gov/const/www/ototpage.html
County Business Patterns: http://www.census.gov/econ/cbp/index.html
Bureau of Labor Statistics: http://www.bls.gov/data/ Table BMNR

3.2.3.8 Residential Construction

a. Source Category Description

Emissions from residential construction activity are a function of the acreage disturbed and volume of soil excavated for residential construction. Residential construction activity is developed from data obtained from the U.S. Department of Commerce (DOC)'s Bureau of the Census

Source Classification Code	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four
2311010000	Industrial Processes	Construction: SIC 15 - 17	Residential	Total

b. Activity Data

There are really two types of activity calculations going on for this SCC, acres of surface soil disturbed, and volume of soil removed for basements

Surface Soil disturbed
The US Census Bureau has 2008 data for *Housing Starts - New Privately Owned Housing Units Started*[1] which provides regional level housing starts based on the groupings of 1 unit, 2-4 units, 5 or more units. A consultation with the Census Bureau in 2002 gave a breakdown of approximately 1/3 of the housing starts being for 2 unit structures, and 2/3 being for 3 and 4 unit structures. The 2-4 unit category was then divided into 2-units, and 3-4 units based on this ratio. To get the number of structures for each grouping, the 1unit category was divided by 1, 2 unit category was divided by 2, and the 3-4 unit category was divided by 3.5. The 5 or more unit category listed may be made up of more than one structure. *New Privately Owned Housing Units Authorized Unadjusted Units*[2] gives a conversion factor to determine the ratio of structures to units in the 5 or more unit category. For example if a county has one 40unit apartment building, the ratio would be 40/1. If there are 5 different 8 unit buildings in the same project, the ratio would be 40/5. Structures started by category are then calculated at a regional level. The table *Annual Housing Units Authorized by Building Permit*[3] has 2007 data at the county level to allocate regional housing starts to the county level. This results in county level housing starts by number of units. The following surface areas were assumed disturbed for each unit type:

Table 1: Surface Soil removed per unit type

1-Unit	1/4 acre/structure
2-Unit	1/3 acre/structure
Apartment	1/2 acre/structure

The 3-4 unit category was considered to be an apartment. Multiplication of housing starts to soil removed results in number of acres disturbed for each unit category.

Basement soil removal
To calculate basement soil removal, 2007 *Characteristics of New Houses*[4] is used to estimate the percentage of 1 unit structures that have a basement (on the regional level). The county level estimate of number of 1 unit starts is multiplied by the percent of 1 unit houses in the region that have a basement to get the number of basements in a county. Basement volume is calculated by assuming a 2000 square foot house has a basement dug to a depth of 8 feet (making 1600 ft^3 per basement). An additional 10% is added for peripheral dirt bringing the total to 1760 ft^3 per basement.

c. Emission Factors

Initial PM_{10} emissions from construction of single family, two family, and apartments structures are calculated using the emission factors given in Table 2. The duration of construction activity for houses is assumed to be 6 months and the duration of construction for apartments is assumed to be 12 months.

Table 2. Emission Factors for Residential Construction

Type of Structure	Emission Factor	Duration of Construction
Apartments	0.11 tons PM10/acre-month	12 months
2-Unit Structures	0.032 tons PM10/acre-month	6 months
1-Unit Structures w/o Basements	0.032 tons PM10/acre-month	6 months
1-unit Structures with Basements	0.011 tons PM10/acre-month	6 months
	0.059 tons PM10/1000 cubic yards	

Regional variances in construction emissions are corrected using soil moisture level, silt content, and control efficiency. These correction parameters are applied to initial PM_{10} emissions from residential construction to develop the final emissions inventory.

To account for the soil moisture level, the PM_{10} emissions are weighted using the precipitation-evaporation (PE) values from Thornthwaite's PE Index. Average precipitation evaporation values for each State were estimated based on PE values for specific climatic divisions within a State. These values range from 7 to 41.

To account for the silt content, thePM_{10} emissions are weighted using average silt content for each county. A data base containing county-level dry silt values was complied. These values

were derived by applying a correction factor developed by the California Air Resources Board to convert wet silt values to dry silt values.[5]

The equation for PM_{10} emissions corrected for soil moisture and silt content is:

$$Corrected\ E_{PM10} = Initial\ E_{PM10} \times \frac{24}{PE} \times \frac{S}{9\%}$$

where: Corrected E_{PM10} = PM_{10} emissions corrected for soil moisture and silt content,
PE = precipitation-evaporation value for each State,
S = % dry silt content in soil for area being inventoried.

Once PM_{10} adjustments have been made, PM_{25} emissions are set to 20% of PM_{10}

d. Control Factors

No control measures are assumed for this category.

e. Example Calculation

PM_{10} Emissions = $\sum(A_{unit} \times T_{construction} \times EF_{unit}) \times Adj_{PM}$
Where $A_{unit} = HS_{Unit} \times SM_{Unit}$
HS_{Unit} = Regional Housing Starts x (county building permits/Regional building permits)
SM_{Unit} = Area or volume of soil moved for the given unit type
$T_{Construction}$ = Construction time (in months) for given unit type
EF_{Unit} = Unadjusted emission factor for PM_{10} for the given unit type
Adj_{PM} = PM Adjustment factor

f. References

New Privately Owned Housing Units Started for 2008 (Not seasonally adjusted) http://www.census.gov/const/startsua.pdf
Table 2au. New Privately Owned Housing Units Authorized Unadjusted Units for Regions, Divisions, and States http://www.census.gov/const/C40/Table2/tb2u2007.txt
Annual Housing Units Authorized by Building Permits CO2007A, purchased from US Department of Census
Type of Foundation in New One-Family Houses Completed, http://www.census.gov/const/C25Ann/sftotalfoundation.pdf

3.2.3.9 Road Construction

a. Source Category Description

Emissions from road construction activity are a function of the acreage disturbed for road construction. Road construction activity is developed from data obtained from the Federal Highway Administration (FHWA).

Source Classification Code	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four
2311030000	Industrial Processes	Construction: SIC 15 - 17	Road Construction	Total

b. Activity

The Federal Highway Administration has *Highway Statistics, Section IV - Highway Finance, Table SF-12A, State Highway Agency Capital Outlay*[1] for 2006 which outlines spending by state in several different categories. For this SCC, the following columns are used: New Construction, Relocation, Added Capacity, Major Widening, and Minor Widening. These columns are also differentiated according to the following six classifications:

1. Interstate, urban
2. Interstate, rural
3. Other arterial, urban
4. Other arterial, rural
5. Collectors, urban
6. Collectors, rural

The State expenditure data are then converted to new miles of road constructed using $/mile conversions obtained from the North Carolina Department of Transportation (NCDOT) in 2000. A conversion of $4 million/mile is applied to the interstate expenditures. For expenditures on other arterial and collectors, a conversion factor of $1.9 million/mile is applied, which corresponds to all other projects.

The new miles of road constructed is used to estimate the acreage disturbed due to road construction. The total area disturbed in each state is calculated by converting the new miles of road constructed to acres using an acres disturbed/mile conversion factor for each road type as given in the table below:

Table 1: Spending per mile and Acres disturbed per mile by highway type

Road Type	Thousand Dollars per mile	Acres Disturbed per mile
URBAN AREAS, INTERSTATE	4000	15.2
RURAL AREAS, INTERSTATE	4000	15.2

Road Type	Thousand Dollars per mile	Acres Disturbed per mile
URBAN AREAS, OTHER ARTERIALS	1900	15.2
RURAL AREAS, OTHER ARTERIALS	1900	12.7
URBAN AREAS, COLLECTORS	1900	9.8
RURAL AREAS, COLLECTORS	1900	7.9

Residential building starts[2] are used to allocate the state-level acres disturbed by road construction to the county. A ratio of the number of building starts in each county to the total number of building starts in each state is applied to the state-level acres disturbed to estimate the total number of acres disturbed by road construction in each county.

c. Emission Factors

Initial PM_{10} emissions from construction of roads are calculated using an emission factor of 0.42 tons/acre/month. Since most road construction consists of grading and leveling of land, the higher emission factor more accurately reflects the high level of cut and fill activity that occurs at road construction sites. The duration of construction activity for road construction is assumed to be 12 months.

Regional variances in construction emissions are corrected using soil moisture level, silt content, and control efficiency. These correction parameters are applied to initial PM_{10} emissions from non-residential construction to develop the final emissions inventory.

To account for the soil moisture level, the PM_{10} emissions are weighted using the precipitation-evaporation (PE) values from Thornthwaite's PE Index. Average precipitation evaporation values for each State were estimated based on PE values for specific climatic divisions within a State. These values range from 7 to 41.

To account for the silt content, thePM_{10} emissions are weighted using average silt content for each county. A data base containing county-level dry silt values was complied. These values were derived by applying a correction factor developed by the California Air Resources Board to convert wet silt values to dry silt values.

The equation for PM_{10} emissions corrected for soil moisture and silt content is:

$$Corrected\ E_{PM10} = Initial\ \mathrm{E}_{PM10} \times \frac{24}{PE} \times \frac{S}{9\%}$$

where: Corrected E_{PM10} = PM_{10} emissions corrected for soil moisture and silt content,
PE = precipitation-evaporation value for each State,
S = % dry silt content in soil for area being inventoried.

Once PM_{10} adjustments have been made, PM_{25} emissions are set to 20% of PM_{10}

d. Control Factors

No control measures are assumed for this category.

e. Example Calculation

$Emissions_{PM10} = \sum(HD_{rt} \times MC_{rt} \times AC_{rt}) \times (HS_{County} / HS_{State}) \times EFAdj$

Where HD_{rt} = Highway Spending for a specific road type
MC_{rt} = Mileage conversion for a specific road type
AC_{rt} = Acreage conversion for a specific road type
HS_{County} = Housing Starts in a given county
HS_{State} = Housing Starts in a given State
EF_{Adj} = Adjusted PM10 Emission Factor

f. References

2006 Highway Spending : http://www.fhwa.dot.gov/policy/ohim/hs06/xls/sf12a.xls
Annual Housing Units Authorized by Building Permits CO2007A, purchased from US Department of Census

3.2.3.10 Agricultural Production – Livestock

a. Source Category Description

Livestock refers to domesticated animals intentionally reared for the production of food, fiber, or other goods or for the use of their labor. The definition of livestock in this category includes beef cattle, dairy cattle, ducks, geese, goats, horses, poultry, sheep, and swine.

The approach to calculating emissions for the assigned SCCs consisted of four general steps, as follows:

- Determining county-level population of animals for 2007.
- For beef, dairy, poultry, and swine, apportioning animal populations to a manure management train (MMT) for each county. Animal populations for ducks, geese, goats, horses, and sheep were not apportioned to MMTs.
- Modifying the emission factor files provided with the CMU Ammonia Model v. 3.6 to ensure that every county had an assigned emission factor.[1]
- Using the CMU Ammonia Model v. 3.6 to calculate ammonia emissions based on the updated county-level animal populations and emission factors.

For this source category, the following SCCs were assigned:

SCC	Descriptor 2	Descriptor 4	Descriptor 7	Descriptor 8
2805001100	Miscellaneous Area Sources	Agriculture Production - Livestock	Beef cattle - finishing operations on feedlots (drylots)	Confinement
2805001200	Miscellaneous Area Sources	Agriculture Production - Livestock	Beef cattle - finishing operations on feedlots (drylots)	Manure handling and storage
2805001300	Miscellaneous Area Sources	Agriculture Production - Livestock	Beef cattle - finishing operations on feedlots (drylots)	Land application of manure
2805002000	Miscellaneous Area Sources	Agriculture Production - Livestock	Beef cattle production composite	Not Elsewhere Classified
2805003100	Miscellaneous Area Sources	Agriculture Production - Livestock	Beef cattle - finishing operations on pasture/range	Confinement
2805007100	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry production - layers with dry manure management systems	Confinement

SCC	Descriptor 2	Descriptor 4	Descriptor 7	Descriptor 8
2805007300	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry production - layers with dry manure management systems	Land application of manure
2805008100	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry production - layers with wet manure management systems	Confinement
2805008200	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry production - layers with wet manure management systems	Manure handling and storage
2805008300	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry production - layers with wet manure management systems	Land application of manure
2805009100	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry production - broilers	Confinement
2805009200	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry production - broilers	Manure handling and storage
2805009300	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry production - broilers	Land application of manure
2805010100	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry production - turkeys	Confinement
2805010200	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry production - turkeys	Manure handling and storage
2805010300	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry production - turkeys	Land application of manure
2805018000	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle composite	Not Elsewhere Classified
2805019100	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle - flush dairy	Confinement
2805019200	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle - flush dairy	Manure handling and storage
2805019300	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle - flush dairy	Land application of manure
2805021100	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle - scrape dairy	Confinement

SCC	Descriptor 2	Descriptor 4	Descriptor 7	Descriptor 8
2805021200	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle - scrape dairy	Manure handling and storage
2805021300	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle - scrape dairy	Land application of manure
2805022100	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle - deep pit dairy	Confinement
2805022200	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle - deep pit dairy	Manure handling and storage
2805022300	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle - deep pit dairy	Land application of manure
2805023100	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle - drylot/pasture dairy	Confinement
2805023200	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle - drylot/pasture dairy	Manure handling and storage
2805023300	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle - drylot/pasture dairy	Land application of manure
2805025000	Miscellaneous Area Sources	Agriculture Production - Livestock	Swine production composite	Not Elsewhere Classified (see also 28-05-039, -047, -053)
2805030000	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry Waste Emissions	Not Elsewhere Classified (see also 28-05-007, -008, -009)
2805030007	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry Waste Emissions	Ducks
2805030008	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry Waste Emissions	Geese
2805035000	Miscellaneous Area Sources	Agriculture Production - Livestock	Horses and Ponies Waste Emissions	Not Elsewhere Classified
2805039100	Miscellaneous Area Sources	Agriculture Production - Livestock	Swine production - operations with lagoons (unspecified animal age)	Confinement
2805039200	Miscellaneous Area Sources	Agriculture Production - Livestock	Swine production - operations with lagoons (unspecified animal age)	Manure handling and storage

SCC	Descriptor 2	Descriptor 4	Descriptor 7	Descriptor 8
2805039300	Miscellaneous Area Sources	Agriculture Production - Livestock	Swine production - operations with lagoons (unspecified animal age)	Land application of manure
2805040000	Miscellaneous Area Sources	Agriculture Production - Livestock	Sheep and Lambs Waste Emissions	Total
2805045000	Miscellaneous Area Sources	Agriculture Production - Livestock	Goats Waste Emissions	Not Elsewhere Classified
2805047100	Miscellaneous Area Sources	Agriculture Production - Livestock	Swine production - deep-pit house operations (unspecified animal age)	Confinement
2805047300	Miscellaneous Area Sources	Agriculture Production - Livestock	Swine production - deep-pit house operations (unspecified animal age)	Land application of manure
2805053100	Miscellaneous Area Sources	Agriculture Production - Livestock	Swine production - outdoor operations (unspecified animal age)	Confinement

b. Activity Data

County-level animal numbers for 2007 were obtained from the U.S. Department of Agriculture's 2007 Census of Agriculture report.[2] For Virginia, the county-level census data includes animal populations from Virginia's 39 independent cities. For some counties and states, census data was withheld to avoid disclosing data for individual farms. However, the total national-level animal numbers and most state-level animal numbers for each livestock type reported in the Census include those animal numbers not disclosed at the county-level. When available, state-level animal numbers from the USDA NASS online database were used for states with undisclosed animal numbers in the 2007 Census of Agriculture.[3] To determine the total number of undisclosed animals, disclosed county-level animal numbers for each livestock type were summed and subtracted from the total state animal numbers. The total undisclosed animal population for a specific livestock type was then allocated to those counties reporting undisclosed data based on the number of farms raising that livestock in each county.[2] If the state-level data was undisclosed and not available in the NASS database, then national animal numbers were used to determine undisclosed state numbers. The disclosed county-level data was then summed and subtracted from the state-level data to determine animal numbers not disclosed at the county-level. These numbers were then allocated to those counties reporting undisclosed data based on the number of farms raising that livestock in each county.

County-level animal numbers were apportioned to manure management trains. A MMT consists of an animal confinement area (e.g., drylot, pasture, flush, scrape); components used to store,

process, or stabilize the manure (e.g., anaerobic lagoons, deep pits); and a land application site where manure is used as a fertilizer source.[4] The apportionment was based on county-level MMT percentages derived from the CMU Ammonia Model. For each livestock type, the county-level number of animals in each MMT was divided by the total county-level animal population for that livestock type to calculate the percentage of total animals managed by each MMT. In cases where the county-level numbers were zero in the 2002 CMU Ammonia Model input files, the county was assigned state-level MMT percentages. The county-level animal population for each livestock type from the 2007 Census of Agriculture was multiplied by the MMT percentages to determine the total number of animals in each MMT in 2007. Animal populations for ducks, geese, goats, horses, and sheep were not apportioned to MMTs.

Cattle reported as "Other Cattle" in the 2007 Census of Agriculture were divided between dairy cattle and beef cattle at the county-level using percent allocations derived from county-level dairy and beef cattle reported in the 2007 Census of Agriculture and corrected for undisclosed data. The animal numbers from "Other Cattle" apportioned to dairy and beef cattle were used to create the Dairy Cattle – Composite and Beef Cattle – Composite activity input files for the CMU Ammonia Model.

County-level pullet numbers reported in the 2007 Census of Agriculture were used to create the Poultry – Composite activity input file for the CMU Ammonia Model.

c. Emission Factors

The emission factor for the poultry composite categories was obtained from an EPA report and is reported in Table 1 below.[4] The county-level emission factors for the beef composite and dairy composite categories were developed using beef and dairy cattle emission factors provided with the 2002 CMU Model. Specifically, weighted average emission factors were calculated based on the number of beef or dairy cattle in each MMT from the 2002 CMU Model activity files and the emission factor assigned to each MMT. All other emission factors were provided with the CMU Ammonia Model v.3.6. The emission factors for some counties in the CMU Ammonia Model files were zero. To ensure that all counties with animal populations were assigned emissions factors, the emission factor input files provided with the CMU Ammonia Model were modified. For all counties with an emission factor of zero, the emission factor was replaced with the state average emission factor. If all counties in the state had emission factors of zero, then the county emission factor was replaced with the national average emission factor. The state average emission factor was calculated by summing the counties with non-zero emission factors in the state and dividing the total by the number of counties in that state with non-zero emission factors. The national average emission factor was calculated by summing the counties with non-zero emission factors in the nation and dividing the total by the number of counties in the nation with non-zero emission factors.

d. Emissions

The livestock activity files provided with the CMU Ammonia Model v.3.6 were replaced with the updated county-level animal population files and modified emissions files. County-level ammonia emissions were then calculated by running the model.

e. Sample Calculations

Allocation of Undisclosed Data

From the 2007 Census of Agriculture, the total national number of beef cattle in Alabama is 678,949. The total number of beef cattle disclosed at the county-level is 388,827.

Total number of beef cattle undisclosed at the county-level = 678,949 - 338,827 = 340,122

From the 2007 Census of Agriculture, the total number of farms in Alabama not disclosing beef cattle numbers is 10,518.

Average beef cattle per farm not disclosing data = 340,122 / 10,518 = 32.3

For 2007, Baldwin County, Alabama beef cattle data was not disclosed. The total number of farms with beef cattle in Baldwin County is 343.

Estimated number of beef cattle in Baldwin County = 32.3 x 343 = 11,092

Manure Management Train

From the 2002 CMU Ammonia Model input files, Chilton County, Alabama had 79 beef cattle under drylot management and 18,900 beef cattle under pasture management in 2002.

Total beef cattle = 79 + 18,900 = 18,979
% of beef cattle under drylot management = 79 / 18,979 = 0.42
% of beef cattle under pasture management = 18,900 / 18,979 = 99.58

The total number of beef cattle for Chilton County reported in the 2007 Census of Agriculture is 7,939.

Number of beef cattle under drylot management in 2007 = 7,939 x 0.0042 = 33
Number of beef cattle under pasture management in 2007 = 7,939 x 0.9958 = 7,906

"Other Cattle"

For Clay County, Alabama, the 2007 Census of Agriculture reports the number of "Other Cattle" as 5,471, the number of dairy cattle as 216, and the number of beef cattle as 9,096.

Total beef and dairy cattle reported = 216 + 9,096 = 9,312
% of other cattle assigned to beef cattle = (9,096/9,312)*100 = 97.68
% of other cattle assigned to dairy cattle = (216/9,312)*100 = 2.32
Other cattle allocated to beef cattle = 5,471 x .9768 = 5,344
Other cattle allocated to dairy cattle = 5,471 x 0.0232 = 127

f. References

1. Cliff Davidson, Peter Adams, Ross Strader, Rob Pinder, Natalie Anderson, Marian Goebes, and Josh Ayers. The Environmental Institute, Carnegie Mellon University, *CMU Ammonia Model v.3.6*., 2004, at http://www.cmu.edu/ammonia/, accessed 25 April 2009.

2. U.S. Department of Agriculture, *2007 Census of Agriculture*, at http://www.agcensus.usda.gov/, accessed 30 April 2009.

3. U.S. Department of Agriculture, National Agricultural Statistics Service, at http://www.nass.usda.gov/Data_and_Statistics/Quick_Stats/, accessed 28 January 2010.

4. U.S. Environmental Protection Agency, *National Emission Inventory – Ammonia Emissions from Animal Agricultural Operations*, Revised Draft Report, 22 April 2005, p. 4-6, at http://www.epa.gov/ttn/chief/net/2002inventory.html, accessed 5 May 2009.

5. Jonathan Dorn, E.H. Pechan & Associates. 2009. A weighted average emission factor calculated using data from the 2002 CMU Ammonia Model v.3.6.

Table 1. Livestock Emission Factors

Description	Pollutant Code	Emission Factor	Emission Factor Unit	Emission Factor Reference
Beef Cattle - Composite	NH3	county-specific	kg NH_3/cow/month	5
Beef Cattle - Drylot Operation - Confinement	NH3	9.45E-01	kg NH_3/cow/month	1
Beef Cattle - Drylot Operation - Land Application	NH3	state-specific	kg NH_3/cow/month	1
Beef Cattle - Drylot Operation - Manure Storage	NH3	3.78E-04	kg NH_3/cow/month	1
Beef Cattle - Pasture Operation - Confinement	NH3	county-specific	kg NH_3/cow/month	1
Dairy Cattle - Composite	NH3	county-specific	kg NH_3/cow/month	5
Dairy Cattle - Deep Pit Dairy Confinement	NH3	2.42E+00	kg NH_3/cow/month	1

Description	Pollutant Code	Emission Factor	Emission Factor Unit	Emission Factor Reference
Dairy Cattle - Deep Pit Dairy Land Application	NH3	state-specific	kg NH_3/cow/month	1
Dairy Cattle - Deep Pit Dairy Manure Storage	NH3	1.13E-01	kg NH_3/cow/month	1
Dairy Cattle - Drylot Dairy Confinement	NH3	state-specific	kg NH_3/cow/month	1
Dairy Cattle - Drylot Dairy Land Application	NH3	state-specific	kg NH_3/cow/month	1
Dairy Cattle - Drylot Dairy Manure Storage	NH3	state-specific	kg NH_3/cow/month	1
Dairy Cattle - Flush Dairy Confinement	NH3	2.00E+00	kg NH_3/cow/month	1
Dairy Cattle - Flush Dairy Land Application	NH3	state-specific	kg NH_3/cow/month	1
Dairy Cattle - Flush Dairy Manure Storage	NH3	state-specific	kg NH_3/cow/month	1
Dairy Cattle - Scrape Dairy Confinement	NH3	state-specific	kg NH_3/cow/month	1
Dairy Cattle - Scrape Dairy Land Application	NH3	state-specific	kg NH_3/cow/month	1
Dairy Cattle - Scrape Dairy Manure Storage	NH3	state-specific	kg NH_3/cow/month	1
Ducks	NH3	7.67E-02	kg NH_3/duck/month	1
Geese	NH3	7.67E-02	kg NH_3/goose/month	1
Goats	NH3	5.29E-01	kg NH_3/goat/month	1
Horses	NH3	1.02E+00	kg NH_3/horse/month	1
Poultry - Broiler Operation - Confinement	NH3	8.32E-03	kg NH_3/bird/month	1
Poultry - Broiler Operation - Land Application	NH3	6.80E-03	kg NH_3/bird/month	1
Poultry - Broiler Operation - Manure Storage	NH3	1.51E-03	kg NH_3/bird/month	1
Poultry - Composite	NH3	2.00E-02	kg NH_3/bird/month	4
Poultry - Layers - Dry Manure Operation - Confinement	NH3	3.36E-02	kg NH_3/bird/month	1
Poultry - Layers - Dry Manure Operation - Land Application	NH3	county-specific	kg NH_3/bird/month	1
Poultry - Layers - Wet Manure Operation - Confinement	NH3	9.45E-03	kg NH_3/bird/month	1
Poultry - Layers - Wet Manure Operation - Land Application	NH3	county-specific	kg NH_3/bird/month	1
Poultry - Layers - Wet Manure Operation - Manure Storage	NH3	county-specific	kg NH_3/bird/month	1

Description	Pollutant Code	Emission Factor	Emission Factor Unit	Emission Factor Reference
Poultry - Turkey Operation - Confinement	NH3	3.78E-02	kg NH_3/bird/month	1
Poultry - Turkey Operation - Land Application	NH3	3.40E-02	kg NH_3/bird/month	1
Poultry - Turkey Operation - Storage	NH3	6.80E-03	kg NH_3/bird/month	1
Sheep	NH3	2.65E-01	kg NH_3/sheep/month	1
Swine - Composite	NH3	county-specific	kg NH_3/pig/month	1
Swine - Deep Pit Operation - Confinement	NH3	2.65E-01	kg NH_3/pig/month	1
Swine - Deep Pit Operation - Land Application	NH3	county-specific	kg NH_3/pig/month	1
Swine - Lagoon Operation - Confinement	NH3	2.27E-01	kg NH_3/pig/month	1
Swine - Lagoon Operation - Land Application	NH3	county-specific	kg NH_3/pig/month	1
Swine - Lagoon Operation - Manure Storage	NH3	county-specific	kg NH_3/pig/month	1
Swine - Outdoor Operation - Confinement	NH3	county-specific	kg NH_3/pig/month	1

3.2.3.11 Commercial Cooking

a. Source Category Description

Commercial Cooking emissions are for 5 source categories based on equipment type. Emissions estimates are for all types of meat cooked in a particular piece of equipment. Deep fat frying of french fries was also included.

For this source category, the following SCCs were assigned:

Source Classification Code	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four
2302002100	Industrial Processes	Food and Kindred Products: SIC 20	Commercial Cooking - Charbroiling	Conveyorized Charbroiling
2302002200	Industrial Processes	Food and Kindred Products: SIC 20	Commercial Cooking - Charbroiling	Under-fired Charbroiling
2302003000	Industrial Processes	Food and Kindred Products: SIC 20	Commercial Cooking - Frying	Deep Fat Frying
2302003100	Industrial Processes	Food and Kindred Products: SIC 20	Commercial Cooking - Frying	Flat Griddle Frying
2302003200	Industrial Processes	Food and Kindred Products: SIC 20	Commercial Cooking - Frying	Clamshell Griddle Frying

b. Activity Data

Activity data was collected from the US Census Bureau's county level population estimates for July 1, 2008.[1]

c. Control Factors

No controls were assumed for this category.

d. Emission Factors

Emission factors were developed and reviewed by an ERTAC advisory panel composed of state and EPA personnel (Contact: Roy Huntley, huntley.roy@epa.gov). They were created by taking 2002 emissions in the NEI and dividing by the 2002 population to develop per capita emission factors. These emission factors are listed in Table 1.

e. Sample Calculations

Emissions are calculated for each county using emission factors and activity as:

$$E_{x,p} = A_x \times EF_{x,p}$$

where:

$E_{x,p}$ = annual emissions for category x and pollutant p;
A_x = population data associated with category x;
$EF_{x,p}$ = emission factor for category x and pollutant p.

Example:
Using conveyorized charbroiling in Allegheny County, PA as an example:

According to the US Census Bureau, population on July 1, 2008 is 1,215,103
The emission factor for VOC is 0.01205 lb/person

E_{VOC}= 1,215,103 people × 0.01205 lb VOC/ person

= 14,650 lb VOC or 7.3 ton VOC

f. References

1. DOC, 2008: U.S. Department of Commerce, Bureau of the Census, 2008 *Population Estimates Program GCT-T1: Population Estimates*, Washington, DC.

Table 1: Commercial Cooking Emission Factors Developed by ERTAC

SCC	SCC description	Pollutant Code	Factor Numeric Value	Factor Unit Numerator	Factor Unit Denominator
2302002100	Conveyorized Charbroiling	100027	1.326E-05	LB	EACH
2302002200	Under-fired Charbroiling	100027	6.385E-05	LB	EACH
2302002100	Conveyorized Charbroiling	100414	7.668E-05	LB	EACH
2302002200	Under-fired Charbroiling	100414	5.312E-04	LB	EACH
2302002100	Conveyorized Charbroiling	100425	3.730E-04	LB	EACH
2302002200	Under-fired Charbroiling	100425	2.747E-03	LB	EACH
2302002100	Conveyorized Charbroiling	106445	7.003E-06	LB	EACH
2302002200	Under-fired Charbroiling	106445	4.214E-05	LB	EACH
2302002100	Conveyorized Charbroiling	107062	2.682E-05	LB	EACH
2302002200	Under-fired Charbroiling	107062	2.183E-04	LB	EACH
2302002100	Conveyorized Charbroiling	108883	3.597E-04	LB	EACH
2302002200	Under-fired Charbroiling	108883	2.496E-03	LB	EACH
2302002100	Conveyorized Charbroiling	108952	4.421E-05	LB	EACH
2302002200	Under-fired Charbroiling	108952	3.063E-04	LB	EACH
2302002100	Conveyorized Charbroiling	120127	5.943E-06	LB	EACH
2302002200	Under-fired Charbroiling	120127	1.914E-05	LB	EACH
2302003100	Flat Griddle Frying	120127	8.487E-06	LB	EACH
2302002100	Conveyorized Charbroiling	123386	1.466E-04	LB	EACH
2302002200	Under-fired Charbroiling	123386	1.113E-03	LB	EACH

SCC	SCC description	Pollutant Code	Factor Numeric Value	Factor Unit Numerator	Factor Unit Denominator
2302002100	Conveyorized Charbroiling	129000	8.852E-06	LB	EACH
2302002200	Under-fired Charbroiling	129000	3.587E-05	LB	EACH
2302003100	Flat Griddle Frying	129000	3.139E-05	LB	EACH
2302002100	Conveyorized Charbroiling	130498292	2.709E-04	LB	EACH
2302002200	Under-fired Charbroiling	130498292	7.911E-04	LB	EACH
2302003100	Flat Griddle Frying	130498292	2.589E-04	LB	EACH
2302002100	Conveyorized Charbroiling	1330207	7.799E-07	LB	EACH
2302002200	Under-fired Charbroiling	1330207	1.560E-06	LB	EACH
2302002100	Conveyorized Charbroiling	191242	1.309E-06	LB	EACH
2302002200	Under-fired Charbroiling	191242	2.542E-06	LB	EACH
2302002100	Conveyorized Charbroiling	193395	1.278E-06	LB	EACH
2302002200	Under-fired Charbroiling	193395	1.723E-06	LB	EACH
2302002100	Conveyorized Charbroiling	206440	6.484E-06	LB	EACH
2302002200	Under-fired Charbroiling	206440	2.638E-05	LB	EACH
2302003100	Flat Griddle Frying	206440	2.371E-05	LB	EACH
2302002100	Conveyorized Charbroiling	208968	2.476E-05	LB	EACH
2302002200	Under-fired Charbroiling	208968	6.372E-05	LB	EACH
2302003100	Flat Griddle Frying	208968	4.886E-06	LB	EACH
2302002100	Conveyorized Charbroiling	50000	7.796E-04	LB	EACH
2302002200	Under-fired Charbroiling	50000	5.876E-03	LB	EACH
2302002100	Conveyorized Charbroiling	50328	1.450E-06	LB	EACH
2302002200	Under-fired Charbroiling	50328	2.332E-06	LB	EACH
2302003100	Flat Griddle Frying	50328	1.154E-06	LB	EACH
2302002100	Conveyorized Charbroiling	56553	1.772E-06	LB	EACH
2302002200	Under-fired Charbroiling	56553	5.432E-06	LB	EACH
2302003100	Flat Griddle Frying	56553	2.918E-06	LB	EACH
2302002100	Conveyorized Charbroiling	71432	1.006E-03	LB	EACH
2302002200	Under-fired Charbroiling	71432	7.351E-03	LB	EACH
2302002100	Conveyorized Charbroiling	75070	5.562E-04	LB	EACH
2302002200	Under-fired Charbroiling	75070	4.242E-03	LB	EACH
2302002100	Conveyorized Charbroiling	83329	1.613E-06	LB	EACH
2302002200	Under-fired Charbroiling	83329	2.776E-06	LB	EACH
2302003100	Flat Griddle Frying	83329	1.357E-06	LB	EACH
2302002100	Conveyorized Charbroiling	84742	4.140E-06	LB	EACH
2302002200	Under-fired Charbroiling	84742	2.413E-05	LB	EACH

SCC	SCC description	Pollutant Code	Factor Numeric Value	Factor Unit Numerator	Factor Unit Denominator
2302002100	Conveyorized Charbroiling	85018	2.771E-05	LB	EACH
2302002200	Under-fired Charbroiling	85018	8.647E-05	LB	EACH
2302003100	Flat Griddle Frying	85018	6.021E-05	LB	EACH
2302002100	Conveyorized Charbroiling	86737	6.408E-06	LB	EACH
2302002200	Under-fired Charbroiling	86737	2.003E-05	LB	EACH
2302003100	Flat Griddle Frying	86737	6.484E-06	LB	EACH
2302002100	Conveyorized Charbroiling	91203	1.135E-04	LB	EACH
2302002200	Under-fired Charbroiling	91203	2.649E-04	LB	EACH
2302003100	Flat Griddle Frying	91203	1.308E-04	LB	EACH
2302002100	Conveyorized Charbroiling	92524	1.271E-05	LB	EACH
2302002200	Under-fired Charbroiling	92524	2.613E-05	LB	EACH
2302003100	Flat Griddle Frying	92524	2.788E-06	LB	EACH
2302002100	Conveyorized Charbroiling	95476	6.167E-05	LB	EACH
2302002200	Under-fired Charbroiling	95476	4.387E-04	LB	EACH
2302002100	Conveyorized Charbroiling	95487	3.482E-06	LB	EACH
2302002200	Under-fired Charbroiling	95487	2.111E-05	LB	EACH
2302002100	Conveyorized Charbroiling	98862	4.991E-06	LB	EACH
2302002200	Under-fired Charbroiling	98862	3.250E-05	LB	EACH
2302002100	Conveyorized Charbroiling	CO	4.245E-02	LB	EACH
2302002200	Under-fired Charbroiling	CO	1.350E-01	LB	EACH
2302003000	Deep Fat Flying	CO	0.000E+00	LB	EACH
2302003100	Flat Griddle Frying	CO	1.269E-02	LB	EACH
2302003200	Clamshell Griddle Frying	CO	0.000E+00	LB	EACH
2302002200	Under-fired Charbroiling	NOX	0.000E+00	LB	EACH
2302002100	Conveyorized Charbroiling	PM10-FIL	1.648E-04	LB	EACH
2302002200	Under-fired Charbroiling	PM10-FIL	1.048E-03	LB	EACH
2302003100	Flat Griddle Frying	PM10-FIL	2.727E-04	LB	EACH
2302003200	Clamshell Griddle Frying	PM10-FIL	1.981E-05	LB	EACH
2302002100	Conveyorized Charbroiling	PM10-PRI	4.980E-02	LB	EACH
2302002200	Under-fired Charbroiling	PM10-PRI	3.528E-01	LB	EACH
2302003000	Deep Fat Flying	PM10-PRI	0.000E+00	LB	EACH
2302003100	Flat Griddle Frying	PM10-PRI	1.031E-01	LB	EACH
2302003200	Clamshell Griddle Frying	PM10-PRI	6.994E-03	LB	EACH
2302002100	Conveyorized Charbroiling	PM25-FIL	1.597E-04	LB	EACH
2302002200	Under-fired Charbroiling	PM25-FIL	1.013E-03	LB	EACH
2302003100	Flat Griddle Frying	PM25-FIL	2.074E-04	LB	EACH
2302003200	Clamshell Griddle Frying	PM25-FIL	1.685E-05	LB	EACH

SCC	SCC description	Pollutant Code	Factor Numeric Value	Factor Unit Numerator	Factor Unit Denominator
2302002100	Conveyorized Charbroiling	PM25-PRI	4.827E-02	LB	EACH
2302002200	Under-fired Charbroiling	PM25-PRI	3.415E-01	LB	EACH
2302003000	Deep Fat Flying	PM25-PRI	0.000E+00	LB	EACH
2302003100	Flat Griddle Frying	PM25-PRI	7.834E-02	LB	EACH
2302003200	Clamshell Griddle Frying	PM25-PRI	5.910E-03	LB	EACH
2302002200	Under-fired Charbroiling	SO2	0.000E+00	LB	EACH
2302002100	Conveyorized Charbroiling	VOC	1.206E-02	LB	EACH
2302002200	Under-fired Charbroiling	VOC	4.148E-02	LB	EACH
2302003000	Deep Fat Flying	VOC	1.261E-02	LB	EACH
2302003100	Flat Griddle Frying	VOC	5.943E-03	LB	EACH
2302003200	Clamshell Griddle Frying	VOC	2.316E-04	LB	EACH

3.2.3.12 Asphalt Paving – Cutback

a. Source Category Description

Asphalt paving is the process of applying asphalt concrete to seal or repair the surface of roads, parking lots, driveways, walkways, or airport runways. Asphalt concrete is a composite material comprised of a binder and a mineral aggregate. The binder, referred to as asphalt cement, is a byproduct of petroleum refining and contains the semi-solid residual material left after the more volatile chemical fractions have been distilled off.[1]

Asphalt cements thinned with petroleum distillates are known as cutback asphalts. The primary uses of cutback asphalt include tack and seal operations, priming roadbeds, and paving operations for pavements up to several inches thick. Cut-back asphalt is produced by thinning the binder in a diluent containing 25 to 45 percent petroleum distillates by volume prior to mixing with the aggregate. This reduces the viscosity of the asphalt making it easier to work with the mixture.

Emissions from cutback asphalt result from the evaporation of VOCs and HAPS after the mixture is laid down. Of all asphalt types, cutback asphalt has the highest diluent content and, as a result, emits the highest levels of VOCs per ton used. The timeframe and quantity of VOC and HAP emissions depend on the type and the quantity of organic solvent used as a diluent.

For this source category, the following SCC was assigned:

SCC	SCC Level 1	SCC Level 2	SCC Level 3	SCC Level 4
2461021000	Solvent Utilization	Miscellaneous Non-industrial: Commercial	Cutback Asphalt	Total: All Solvent Types

The general approach to calculating emissions from cutback asphalt paving is to multiply the estimated county-level cutback asphalt usage by emission factors for VOCs and HAPs.

b. Activity Data

State-level cutback asphalt usage in 2008 was obtained from the Asphalt Institute's *2008 Asphalt Usage Survey*.[2] State-level data were allocated to county-level according to the fraction of paved road vehicle miles traveled (VMT) in each county.

Total annual VMT estimates by State and roadway class were obtained from the Federal Highway Administration's (FHWA) annual Highway Statistics report.[3] Paved road VMT was calculated by subtracting the State/roadway class unpaved road VMT from total State/roadway class VMT. State-level paved road VMT was spatially allocated to counties according to the fraction of total VMT in each county for the specific roadway class as shown by the following equation:

$$VMT_{x,total} = \sum VMT_{ST,y} * VMT_{x,y} / VMT_{ST,y}$$

where: $VMT_{x,total}$ = VMT (million miles) in county x on all paved roadways
$VMT_{ST,y}$ = paved road VMT for the entire State for roadway class y
$VMT_{x,y}$ = total VMT (million miles) in county x and roadway class y

$VMT_{ST,y}$ = total VMT (million miles) in entire State for roadway class y

The county-level total VMT by roadway class used in this calculation was previously developed by E.H. Pechan and Associates, Inc. to support the onroad national emissions inventory.[4]

c. Emission Factors

Emission factors for cutback asphalt usage were obtained from the *Technical Report Series* produced by the U.S. EPA's Emission Inventory Improvement Program and are reported in Table 1 below.[1]

d. Emissions

Emissions were calculated by multiplying the county-level asphalt usage (barrels) by the emission factors listed in Table 1 and then dividing by 2000 to convert pounds to tons.

$$Emissions_{x,y} = (Asphalt\ Usage_x * EF_y) / 2000$$

where: $Emissions_{x,y}$ = emissions (tons) of pollutant y in county x
$Asphalt\ Usage_x$ = cutback asphalt (barrels) used in county x
EF_y = emission factor for pollutant y

To convert tons of asphalt reported in the *2008 Asphalt Usage Survey* to barrels, it was assumed that the density of asphalt is similar to that of water, 8.34 lbs/gal, and that one barrel equals 42 gallons.

Barrels of Asphalt = (tons of asphalt * 2000 lbs / 8.34 lbs/gal) / 42 gal/barrel

Note that one barrel of asphalt weights approximately 350 pounds.

e. Sample Calculation

VOC emissions from cutback asphalt usage in Autauga County, Alabama:

From the *2008 Asphalt Usage Survey*, the state of Alabama used 1,728 tons of cutback asphalt in 2008. The fraction of paved road VMT traveled in Autauga County is 497 million miles divided by 53,633 million miles which equals 0.0093.

$Asphalt\ Usage_{Autauga}$ = ((1,728 tons * 2000 lbs / 8.34 lbs/gal) / 42 gal/barrel) * 0.0093

$Asphalt\ Usage_{Autauga}$ = 91.41 barrels

$VOC\ Emissions_{Autauga}$ = (91.41 barrels * 88 lbs/barrel) / 2000 lbs/ton

$VOC\ Emissions_{Autauga}$ = 4.022 tons

Table 1. Criteria and HAP Emission Factors for Cutback Asphalt Paving

Pollutant Description	Pollutant Code	Emission Factor (LBS/BARREL)	Emission Factor Reference
VOLATILE ORGANIC COMPOUNDS	VOC	88.00	1
ETHYL BENZENE	100414	2.02	1
TOLUENE	108883	5.63	1
XYLENES (MIXTURE OF O, M, AND P ISOMERS)	1330207	10.74	1

f. References

1. U.S. Environmental Protection Agency, Emissions Inventory Improvement Program, *Technical Report Series*, Volume III – Area Sources, Chapter 17, "Asphalt Paving," prepared by Eastern Research Group, Inc. for EPA, Research Triangle Park, NC, 2001. Available at http://www.epa.gov/ttn/chief/eiip/techreport/volume03/index.html.

2. Asphalt Institute, *2008 Asphalt Usage Survey for the United States and Canada*, http://www.asphaltinstitute.org/.

3. U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics 2007,* Office of Highway Policy Information, Washington, DC, 2008. Available at http://www.fhwa.dot.gov/policyinformation/statistics/2007/.

4. E.H. Pechan & Associates, Inc. "Documentation for the Onroad National Emission Inventory (NEI) for Base Years 1970 - 2002," report prepared for U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC. January 2004.

3.2.3.13 Asphalt Paving – Emulsified

a. Source Category Description

Asphalt paving is the process of applying asphalt concrete to seal or repair the surface of roads, parking lots, driveways, walkways, or airport runways. Asphalt concrete is a composite material comprised of a binder and a mineral aggregate. The binder, referred to as asphalt cement, is a byproduct of petroleum refining and contains the semi-solid residual material left after the more volatile chemical fractions have been distilled off.[1]

Asphalt cements thinned with water and an emulsifying agent are known as emulsified asphalts. This thinning reduces the viscosity of the asphalt making it easier to work with the mixture. The primary uses of emulsified asphalt include tack and seal operations, priming roadbeds, and paving operations for pavements up to several inches thick.

Emulsified asphalt may contain up to 12 percent organic solvents by volume.[1] Emissions from emulsified asphalt result from the evaporation of VOCs after the mixture is laid down. Compared to cutback asphalt, emulsified asphalt has lower VOCs emissions per ton used.

For this source category, the following SCC was assigned:

SCC	SCC Level 1	SCC Level 2	SCC Level 3	SCC Level 4
2461022000	Solvent Utilization	Miscellaneous Non-industrial: Commercial	Emulsified Asphalt	Total: All Solvent Types

The general approach to calculating emissions from emulsified asphalt paving is to multiply the estimated county-level emulsified asphalt usage by emission factors for VOCs.

b. Activity Data

State-level emulsified asphalt usage in 2008 was obtained from the Asphalt Institute's *2008 Asphalt Usage Survey*.[2] State-level data were allocated to county-level according to the fraction of paved road vehicle miles traveled (VMT) in each county.

Total annual VMT estimates by State and roadway class were obtained from the Federal Highway Administration's (FHWA) annual Highway Statistics report.[3] Paved road VMT was calculated by subtracting the State/roadway class unpaved road VMT from total State/roadway class VMT. State-level paved road VMT was spatially allocated to counties according to the fraction of total VMT in each county for the specific roadway class as shown by the following equation:

$$VMT_{x,total} = \sum VMT_{ST,y} * VMT_{x,y} / VMT_{ST,y}$$

where: $VMT_{x,total}$ = VMT (million miles) in county x on all paved roadways
$VMT_{ST,y}$ = paved road VMT for the entire State for roadway class y
$VMT_{x,y}$ = total VMT (million miles) in county x and roadway class y
$VMT_{ST,y}$ = total VMT (million miles) in entire State for roadway class y

The county-level total VMT by roadway class used in this calculation was previously developed by E.H. Pechan and Associates, Inc. to support the onroad national emissions inventory.[4]

c. Emission Factors

Emission factors for emulsified asphalt usage were obtained from the *Technical Report Series* produced by the U.S. EPA's Emission Inventory Improvement Program and are reported in Table 1 below.[1]

d. Emissions

Emissions were calculated by multiplying the county-level asphalt usage (barrels) by the emission factors listed in Table 1 and then dividing by 2000 to convert pounds to tons.

$$Emissions_{x,y} = (Asphalt\ Usage_x * EF_y) / 2000$$

where: $Emissions_{x,y}$ = emissions (tons) of pollutant y in county x
$Asphalt\ Usage_x$ = emulsified asphalt (barrels) used in county x
EF_y = emission factor for pollutant y

To convert tons of asphalt reported in the *2008 Asphalt Usage Survey* to barrels, it was assumed that the density of asphalt is similar to that of water, 8.34 lbs/gal, and that one barrel equals 42 gallons.

$$Barrels\ of\ Asphalt = (tons\ of\ asphalt * 2000\ lbs / 8.34\ lbs/gal) / 42\ gal/barrel$$

Note that one barrel of asphalt weights approximately 350 pounds.

e. Sample Calculation

VOC emissions from emulsified asphalt usage in Autauga County, Alabama:

From the *2008 Asphalt Usage Survey*, the state of Alabama used 18,988 tons of emulsified asphalt in 2008. The fraction of paved road VMT traveled in Autauga County is 497 million miles divided by 53,633 million miles which equals 0.0093.

$$Asphalt\ Usage_{Autauga} = ((18{,}988\ tons * 2000\ lbs / 8.34\ lbs/gal) / 42\ gal/barrel) * 0.0093$$

$$Asphalt\ Usage_{Autauga} = 1{,}004\ barrels$$

$$VOC\ Emissions_{Autauga} = (1{,}004\ barrels * 9.2\ lbs/barrel) / 2000\ lbs/ton$$

$$VOC\ Emissions_{Autauga} = 4.62\ tons$$

Table 1. Criteria Emission Factors for Emulsified Asphalt Paving

Pollutant Description	Pollutant Code	Emission Factor (LBS/BARREL)	Emission Factor Reference
VOLATILE ORGANIC COMPOUNDS	VOC	9.2	1

f. References

1. U.S. Environmental Protection Agency, Emissions Inventory Improvement Program, *Technical Report Series*, Volume III – Area Sources, Chapter 17, "Asphalt Paving," prepared by Eastern Research Group, Inc. for EPA, Research Triangle Park, NC, 2001. Available at http://www.epa.gov/ttn/chief/eiip/techreport/volume03/index.html.

2. Asphalt Institute, *2008 Asphalt Usage Survey for the United States and Canada*, http://www.asphaltinstitute.org/.

3. U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics 2007,* Office of Highway Policy Information, Washington, DC, 2008. Available at http://www.fhwa.dot.gov/policyinformation/statistics/2007/.

4. E.H. Pechan & Associates, Inc. "Documentation for the Onroad National Emission Inventory (NEI) for Base Years 1970 - 2002," report prepared for U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC. January 2004.

3.2.3.14 Gasoline Distribution – Portable Fuel Containers

a. Source Category Description

Portable fuel containers (PFCs, or gas cans) are consumer products used to refuel a wide variety of gasoline-powered equipment.

The general approach to calculating emissions for this SCC is to take the inventories already prepared by the EPA for 2002 and 2010 and apply a linear fit between to get 2008 emissions.

For this source category, the following SCCs were assigned:

SCC	Descriptor 1	Descriptor 3	Descriptor 6	Descriptor 8
2501011011	Storage and Transport	Petroleum and Petroleum Product Storage	Residential Portable Gas Cans	Permeation
2501011012	Storage and Transport	Petroleum and Petroleum Product Storage	Residential Portable Gas Cans	Evaporation (includes Diurnal losses)
2501011013	Storage and Transport	Petroleum and Petroleum Product Storage	Residential Portable Gas Cans	Spillage During Transport
2501011014	Storage and Transport	Petroleum and Petroleum Product Storage	Residential Portable Gas Cans	Refilling at the Pump - Vapor Displacement
2501011015	Storage and Transport	Petroleum and Petroleum Product Storage	Residential Portable Gas Cans	Refilling at the Pump - Spillage
2501012011	Storage and Transport	Petroleum and Petroleum Product Storage	Commercial Portable Gas Cans	Permeation
2501012012	Storage and Transport	Petroleum and Petroleum Product Storage	Commercial Portable Gas Cans	Evaporation (includes Diurnal losses)
2501012013	Storage and Transport	Petroleum and Petroleum Product Storage	Commercial Portable Gas Cans	Spillage During Transport
2501012014	Storage and Transport	Petroleum and Petroleum Product Storage	Commercial Portable Gas Cans	Refilling at the Pump - Vapor Displacement
2501012015	Storage and Transport	Petroleum and Petroleum Product Storage	Commercial Portable Gas Cans	Refilling at the Pump - Spillage

b. Activity Data

Activity data for the 2002 and 2010 inventories were developed using EPA's Nonroad Model which uses a variety of variables like equipment size, equipment population, equipment age, RVP, and air temperature to estimate activity.

c. Control Factors

There are at least 15 states which have enacted or are considering rules for PFCs. Due to the complexities in calculating emissions, these rules have already been accounted for in the emissions, but will not be listed in the control table.

d. Emission Factors

Section 2.2 of the EPA PFC report details emission factors used for each of the activities associated with PFCs.

e. Sample Calculations

Emissions are calculated in the formula

$$Emis_{County,\ Pollutant} = m \times year_{diff} + Emis_{2002}$$

where:

$$m = (Emis_{2010} - Emis_{2002}) / (2010 - 2002)$$

Example:

Using SCC 2501011011 in Allegheny County PA as an example:

$Emis_{2010}$ = 60.7 tons VOC
$Emis_{2002}$ = 181.7 tons VOC

$m = (60.7 - 181.7) / (2010 - 2002) = -15.125$

$$Emis_{Alegheny,\ VOC} = -15.125 \times (2008-2002) + 181.7$$

= 90.95 tons VOC

f. References

U.S. Environmental Protection Agency. Estimating Emissions Associated with Portable Fuel Containers (PFCs). Ann Arbor Michigan. February 2007

3.2.3.15 Aviation Gasoline Distribution – Stage I

a. Source Category Description

Aviation gasoline (also called "AvGas") is the only aviation fuel that contains tetraethyl lead (TEL) as a knock-out component for small reciprocating, piston-engine crafts in civil aviation.[1] Commercial and military aviation rarely use this fuel. AvGas is shipped to airports and is filled into bulk terminals, and then into tanker trucks. These processes fall under the definition of stage I, displacement vapors during the transfer of gasoline from tank trucks to storage tanks, and vice versa. These processes are subject to EPA's maximum available control technology (MACT) standards for gasoline distribution.[2]

For this source category, the following SCC was assigned:

SCC	SCC Level 1	SCC Level 2	SCC Level 3	SCC Level 4
2501080050	Storage and Transport	Petroleum and Petroleum Product Storage	Airports : Aviation Gasoline	Stage 1: Total

b. Activity Data

The amount of AvGas consumed was obtained from the Petroleum Supply Annual for designated Petroleum Administration Districts, or PADs.[3] A nationwide total of 5,603,000 barrels of AvGas were consumed in 2008 (Table 1).[3] This information was used to calculate national-level emissions estimates for one criteria pollutant and ten hazardous air pollutants (HAPs). Assumptions for bulk plant processes are summarized in Table 2.

c. Emission Factors

Emission factors were provided by ESD and EIG publications (Tables 3 and 4).[1,4,5,6]

d. Emissions

In general, national-level emissions were calculated by multiplying AvGas consumption by the appropriate emission factors and then summing emissions. The national-level emission estimates were first allocated based on consumption reported for each PAD, and then allocated to the counties within the PADs based on 2008 Landing-Take Off (LTO) data for general aviation flights.[7] General aviation flights were used in this allocation because they are the primary consumers of AvGas.

There are five PADs across the United States[3]
PAD 1 comprises seventeen states plus the District of Columbia along the Atlantic Coast;
PAD 2 comprises fifteen states in the Midwest;
PAD 3 comprises six states in South Central U.S.;

PAD 4 comprises five states in the Rocky Mountains; and
PAD 5 comprises seven states along the West Coast.

Table 1 - Summary of AvGas Consumed and LTOs by PAD in 2008

PAD	AvGas Consumed (barrels)	LTOs
1	1,039,000	17,588,837
2	1,652,000	16,520,073
3	2,021,000	9,883,668
4	158,000	3,311,438
5	733,000	12,641,441
Total	**5,603,000**	**59,945,457**

e. Sample Calculations

National-Level Calculations

Amount of AvGas consumed in 2008 (barrels) = 5,603,000

Conversion: 1 barrel = 42 gallons
1 gallon = 3.78 liters
1 kg = 2.205 lb
1 kg = 1,000,000 mg
1 ton = 2000 lb

Step 1 - Convert AvGas consumption into gallons using conversion factors.

Amount of AvGas consumed in 2008 (gallons) = 5,603,000 barrels * 42 gallons/barrel
Amount of AvGas consumed in 2008 (gallons) = 235,326,000

Step 2 - Use the gallons of AvGas consumed and apply the non-fugitive VOC emission factors in Table 3 to calculate non-fugitive VOC estimates.

Unloading/Tank Filling: tank fill VOC emissions = 0.009021383 LB/GAL * 235,326,000 GAL / 2,000 LB/TON
Unloading/Tank Filling: tank fill VOC emissions = **1,061.48** tpy

Unloading/Tank Filling: Storage tank VOC emissions = 0.003605215 LB/GAL * 235,326,000 GAL / 2,000 LB/TON
Unloading/Tank Filling: Storage tank VOC emissions = **424.20** tpy

Tank Truck Filling - Composite VOC Emissions = 0.010306575 LB/GAL * 235,326,000 GAL * / 2,000 LB/TON
Tank Truck Filling - Composite VOC Emissions = **1,212.70** tpy

Storage Tank - Breathing losses VOC Emissions = 0.001694117 LB/GAL * 235,326,000 GAL * / 2,000 LB/TON
Storage Tank - Breathing losses VOC Emissions = **199.33** tpy

Total non-fugitive VOC emissions = 1,061.48 tpy + 424.20 tpy + 1,212.70 tpy + 199.33 tpy = **2,897.72** tpy

Step 3 - Use the assumptions in Table 2 and the fugitive VOC emission factors in Table 3 to generate fugitive VOC emissions.

AvGas - Fugitive from valves VOC Emissions = (# Bulk Plant Equivalents)*(#valves/plant)*EF*days
AvGas - Fugitive from valves VOC Emissions = (2442 plants) * (50 valves/plant) * (0.573201882 LB/valve/day)* 300 days / 2,000 LB/TON
AvGas - Fugitive from valves VOC Emissions = **10,498.19** tpy

AvGas - Fugitive from pumps VOC Emissions = (# Bulk Plant Equivalents)*(#pumps/plant)* (#seals/pump) * EF * days
AvGas - Fugitive from pumps VOC Emissions = (2442 plants) * (2 pumps/plant) * (4 seals/pump) * (5.952481079 LB/seal/day)* 300 days / 2,000 LB/TON
AvGas - Fugitive from pumps VOC Emissions = **17,443.15** tpy

Total fugitive VOC emissions = 10,498.19 tpy + 17,443.15 tpy
Total fugitive VOC emissions = **27,941.34** tpy

Step 4 - Sum the fugitive and non-fugitive VOC emissions together for total VOC emissions.

Total VOC emissions = 2,897.72 tpy + 27,941.34 tpy = **30,839.06** tpy

Step 5 - Apply the speciation emission factors in Table 4 for tetraethyl lead, 2,2,4-trimethylpentane, benzene, cumene, ethylbenzene, hexane, naphthalene, toluene, and xylene to calculate HAP emissions.

Tetraethyl Lead emissions = 30,839.06 tpy VOC * 9.78 E-6 = **0.30** tpy
2,2,4-Trimethylpentane emissions = 30,839.06 tpy VOC * 0.008 = **246.71** tpy
Benzene emissions = 30,839.06 tpy VOC * 0.009 = **277.55** tpy
Cumene emissions = 30,839.06 tpy VOC * 0.0001 = **3.08** tpy
Ethylbenzene emissions = 30,839.06 tpy VOC * 0.0010 = **30.84** tpy
Hexane emissions = 30,839.06 tpy VOC * 0.0160 = **493.43** tpy
Naphthalene emissions = 30,839.06 tpy VOC * 0.0005 = **15.42** tpy
Toluene emissions = 30,839.06 tpy VOC * 0.0130 = **400.91** tpy
Xylene emissions = 30,839.06 tpy VOC * 0.005 = **154.20** tpy

Step 6 - Use the ethylene dichloride emission factor in Table 4 to calculate ethylene dichloride emissions.

Ethylene dichloride emissions = 235,326,000 GAL * 2.167E-6 LB/GAL * TON/2000 LB
= **0.25** tpy

Table 2 - Assumptions Used For Bulk Terminals Using AvGas

Parameter	Data	Reference
Number of Bulk Plant Equivalents (U.S.)	2,442 plants	1
Number of valves per bulk plant	50 valves/plant	
Number of pumps per bulk plant	2 pumps/plant	
Number of seals per bulk plant	4 seals/pump	
Number of days per year used	300 days	

Table 3 - VOC Emission Factors

Pollutant	Emission Source	Emission Factor	Emission Factor Units	Factor Reference
VOC	Aviation Gas Unloading/ Tank Filling - tank fill	0.009021383	LB/GAL AvGas	1
	Aviation Gas Unloading/ Tank Filling - Storage tank working	0.003605215		
	Aviation Gas Tank Truck Filling - Composite	0.010306575		
	Aviation Gas Storage Tank - Breathing losses	0.001694117		
	Aviation Gas - Fugitive from valves	0.573201882	LB/valve/day	
	Aviation Gas - Fugitive from pumps	5.952481079	LB/seal/day	

Table 4 - HAP Emission Factors

Pollutant	Emission Source	Emission Factor	Emission Factor Units	Factor Reference
Ethylene Dichloride	All processes	2.167 E-6	LB/GAL AvGas	4
Tetraethyl Lead (TEL)	All processes	9.78 E-6	LB/LB VOC	1
2,2,4-Trimethylpentane	All processes	0.0080	LB/ LB VOC	
Benzene	All processes	0.0090		5
Cumene	All processes	0.0001		6
Ethylbenzene	All processes	0.0010		
Hexane	All processes	0.0160		
Naphthalene	All processes	0.0005		
Toluene	All processes	0.0130		
Xylene	All processes	0.0050		5

Example Calculations for Wake County, NC

Wake County VOC emissions = (National VOC emissions) * (PAD 1 consumption/Total consumption) * (Wake County LTOs/PAD 1 LTOs)

Wake County VOC emissions = (30,839.06 tpy) * (1,039,000 bbl/5,603,000 bbl) * (95,234 LTOs/17,588,837 LTOs)

Wake County VOC emissions = **30.96** tpy

Wake County Benzene Emissions = (Wake County VOC emissions)*(Benzene Emission Factor)

Wake County Benzene Emissions = (30.96 tpy VOC) * (0.0090 LB benzene/ LB VOC)* (2000 LB VOC/2000 LB benzene)

Wake County Benzene Emissions = **0.28** tpy

f. References

1. TRC Environmental Corporation. *Estimation of Alkylated Lead Emissions, Final Report*. Prepared for U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards. RTP, NC 1993.

2. U.S. Environmental Protection Agency. National Emission Standards for Source Categories: Gasoline Distribution (Stage I). 40 CFR Part 63. Office of Air Quality Planning and Standards. RTP, NC. February 28, 1997. Pages 9087-9093.

3. Energy Information Administration. *Petroleum Annual Supply, 2008*. Tables 3, 5, 7, 9, and 11. U.S. Department of Energy. Washington, D.C. June 2009. (Internet address: http://www.eia.doe.gov/oil_gas/petroleum/data_publications/petroleum_supply_annual/psa_volume1/psa_volume1.html)

4. U.S. Environmental Protection Agency. *Locating and Estimating Air Emissions from Sources of Ethylene Dichloride*. EPA-450/4-84-007d. RTP, NC. March 1984.

5. Memorandum from Greg LaFlam and Tracy Johnson (PES) to Stephen Shedd (EPA/OAQPS). *Speciated Hazardous Air Pollutants - Baseline Emissions and Emissions Reductions Under the Gasoline Distribution NESHAP*. August 9, 1996.

6. Personal Communication via e-mail from Stephen Shedd (EPA/OAQPS) to Laurel Driver (EPA/OAQPS). E-mail dated May 29, 2002.

7. [LTObyCtyandSCC.mdb], electronic file from Laurel Driver, U.S. Environmental Protection Agency, OAQPS, to U.S. Environmental Protection Agency, OAQPS, November 12, 2009. Aircraft operations data compiled from FAA's Terminal Area Forecasts (TAF) and 5010 Forms.

3.2.3.16 Aviation Gasoline Distribution – Stage II

a. Source Category Description

Aviation gasoline (also called "AvGas") is the only aviation fuel that contains tetraethyl lead (TEL) as a knock-out component for small reciprocating, piston-engine crafts in civil aviation.[1] Commercial and military aviation rarely use this fuel. AvGas is shipped to airports and is filled into bulk terminals, and then into tanker trucks. These processes fall under the definition of stage I are subject to EPA's maximum available control technology (MACT) standards for gasoline distribution.[2] Stage II, discussed here, involves the transfer of fuel from the tanker trucks into general aviation aircraft.

For this source category, the following SCC was assigned:

SCC	SCC Level 1	SCC Level 2	SCC Level 3	SCC Level 4
2501080100	Storage and Transport	Petroleum and Petroleum Product Storage	Airports : Aviation Gasoline	Stage 2: Total

b. Activity Data

The amount of AvGas consumed was obtained from the Petroleum Supply Annual for designated Petroleum Administration Districts, or PADs.[3] A nationwide total of 5,603,000 barrels of AvGas were consumed in 2008 (Table 1).[3] This information was used to calculate national-level emissions estimates for one criteria pollutant and ten hazardous air pollutants (HAPs).

c. Emission Factors

Emission factors were provided by ESD and EIG publications (Tables 2 and 3).[1,4,5,6]

d. Emissions

In general, national-level emissions were calculated by multiplying AvGas consumption by the appropriate emission factors and then summing emissions. The national-level emission estimates were first allocated based on consumption reported for each PAD, and then allocated to the counties within the PADs based on 2008 Landing-Take Off (LTO) data for general aviation flights.[7] General aviation flights were used in this allocation because they are the primary consumers of AvGas.

There are five PADs across the United States[3]
PAD 1 comprises seventeen states plus the District of Columbia along the Atlantic Coast;
PAD 2 comprises fifteen states in the Midwest;
PAD 3 comprises six states in South Central U.S.;
PAD 4 comprises five states in the Rocky Mountains; and
PAD 5 comprises seven states along the West Coast.

Table 1 - Summary of AvGas Consumed and LTOs by PAD in 2008

PAD	AvGas Consumed (barrels)	LTOs
1	1,039,000	17,588,837
2	1,652,000	16,520,073
3	2,021,000	9,883,668
4	158,000	3,311,438
5	733,000	12,641,441
	5,603,000	**59,945,457**

e. Sample Calculations

National-Level Calculations

Amount of AvGas consumed in 2008 (barrels) = 5,603,000

Conversion: 1 barrel = 42 gallons
1 gallon = 3.78 liters
1 kg = 2.205 lb
1 kg = 1,000,000 mg
1 ton = 2000 lb

Step 1 - Convert AvGas consumption into gallons using conversion factors.

Amount of AvGas consumed in 2008 (gallons) = 5,603,000 barrels * 42 gallons/barrel
Amount of AvGas consumed in 2008 (gallons) = 235,326,000

Step 2 - Use the gallons of AvGas consumed and apply the refueling VOC emission factors from Table 2 to first calculate refueling VOC estimates.

AvGas Refueling VOC emissions = (1.36 E-2 LB/gal AvGas) * 235,326,000 gallons * 1 ton/2000 LB
AvGas Refueling VOC emissions = **1,600.22** tpy

Step 3 - Apply the speciation emission factors in Table 3 for 2,2,4-trimethylpentane, benzene, cumene, ethylbenzene, hexane, naphthalene, toluene, and xylene to calculate HAP emissions.

2,2,4-Trimethylpentane emissions = 1,600.22 tpy VOC * 0.008 = **12.80** tpy

Benzene emissions = 1,600.22 tpy VOC * 0.009 = **14.40** tpy
Cumene emissions = 1,600.22 tpy VOC * 0.0001 = **0.16** tpy
Ethylbenzene emissions = 1,600.22 tpy VOC * 0.0010 = **1.60** tpy
Hexane emissions = 1,600.22 tpy VOC * 0.0160 = **25.60** tpy
Naphthalene emissions = 1,600.22 tpy VOC * 0.0005 = **0.80** tpy
Toluene emissions = 1,600.22 tpy VOC * 0.0130 = **20.80** tpy
Xylene emissions = 1,600.22 tpy VOC * 0.005 = **8.00** tpy

Step 6 - Use the ethylene dichloride and tetraethyl lead emission factors in Table 3 to calculate ethylene dichloride emissions.

Ethylene dichloride emissions = 235,326,000 GAL * 1.883 E-6 LB/GAL * TON/2000 LB = **0.22** tpy
Tetraethyl lead emissions = 235,326,000 GAL * 1.327E-7 LB/GAL * TON/2000 LB = **0.015** tpy

Table 2 - VOC Emission Factor

Pollutant	Emission Source	Emission Factor	Emission Factor Units	Factor Reference
VOC	Fuel Transfer from Tanker Trucks to General Aviation Aircraft	0.0136	LB/GAL AvGas	1

Table 3 - HAP Emission Factors

Pollutant	Emission Source	Emission Factor	Emission Factor Units	Factor Reference
Ethylene Dichloride	All processes	1.883 E-6	LB/GAL AvGas	4
Tetraethyl Lead (TEL)	All processes	1.327 E-7	LB/GAL AvGas	1
2,2,4-Trimethylpentane	All processes	0.0080	LB/ LB VOC	
Benzene	All processes	0.0090		5
Cumene	All processes	0.0001		6
Ethylbenzene	All processes	0.0010		
Hexane	All processes	0.0160		
Naphthalene	All processes	0.0005		
Toluene	All processes	0.0130		
Xylene	All processes	0.0050		5

Example Calculations for Wake County, NC

Wake County VOC emissions = (National VOC emissions) * (PAD 1 consumption/Total consumption) * (Wake County LTOs/PAD 1 LTOs)

Wake County VOC emissions = (1,600.22 tpy) * (1,039,000 bbl/5,603,000 bbl) * (95,234 LTOs/17,588,837 LTOs)

Wake County VOC emissions = **1.61** tpy

Wake County Benzene Emissions = (Wake County VOC emissions)*(Benzene Emission Factor)

Wake County Benzene Emissions = (1.61 tpy VOC) * (0.0090 LB benzene/ LB VOC)* (2000 lb VOC/2000 lb benzene)

Wake County Benzene Emissions = **0.014** tpy

f. References

1. TRC Environmental Corporation. *Estimation of Alkylated Lead Emissions, Final Report*. Prepared for U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards. RTP, NC 1993.

2. U.S. Environmental Protection Agency. National Emission Standards for Source Categories: Gasoline Distribution (Stage I). 40 CFR Part 63. Office of Air Quality Planning and Standards. RTP, NC. February 28, 1997. Pages 9087-9093.

3. Energy Information Administration. *Petroleum Annual Supply, 2008*. Tables 3, 5, 7, 9, and 11. U.S. Department of Energy. Washington, D.C. June 2009. (Internet address: http://www.eia.doe.gov/oil_gas/petroleum/data_publications/petroleum_supply_annual/psa_volume1/psa_volume1.html)

4. U.S. Environmental Protection Agency. *Locating and Estimating Air Emissions from Sources of Ethylene Dichloride*. EPA-450/4-84-007d. RTP, NC. March 1984.

5. Memorandum from Greg LaFlam and Tracy Johnson (PES) to Stephen Shedd (EPA/OAQPS). *Speciated Hazardous Air Pollutants - Baseline Emissions and Emissions Reductions Under the Gasoline Distribution NESHAP*. August 9, 1996.

6. Personal Communication via e-mail from Stephen Shedd (EPA/OAQPS) to Laurel Driver (EPA/OAQPS). E-mail dated May 29, 2002.

7. [LTObyCtyandSCC.mdb], electronic file from Laurel Driver, U.S. Environmental Protection Agency, OAQPS, to U.S. Environmental Protection Agency, OAQPS, November 12, 2009. Aircraft operations data compiled from FAA's Terminal Area Forecasts (TAF) and 5010 Forms.

3.2.3.17 Open Burning – Land Clearing Debris

a. Source Category Description

Open burning of land clearing debris is the purposeful burning of debris, such as trees, shrubs, and brush, from the clearing of land for the construction of new buildings and highways. Criteria air pollutant (CAP) and hazardous air pollutant (HAP) emission estimates from open burning of land clearing debris are a function of the amount of material or fuel subject to burning per year.

For this source category, the following SCC was assigned:

SCC	SCC Level 1	SCC Level 2	SCC Level 3	SCC Level 4
2610000500	Waste Disposal, Treatment, and Recovery	Open Burning	All Categories	Land Clearing Debris (use 28-10-005-000 for Logging Debris Burning)

b. Activity Data

The amount of material burned was estimated using the county-level total number of acres disturbed by residential, non-residential, and road construction. County-level weighted loading factors were applied to the total number of construction acres to convert acres to tons of available fuel.

Acres Disturbed from Residential Construction

The US Census Bureau has 2008 data for *Housing Starts - New Privately Owned Housing Units Started*[1] which provides regional level housing starts based on the groupings of 1 unit, 2-4 units, 5 or more units. A consultation with the Census Bureau in 2002 gave a breakdown of approximately 1/3 of the housing starts being for 2 unit structures, and 2/3 being for 3 and 4 unit structures. The 2-4 unit category was divided into 2-units, and 3-4 units based on this ratio. To determine the number of structures for each grouping, the 1 unit category was divided by 1, the 2 unit category was divided by 2, and the 3-4 unit category was divided by 3.5. The 5 or more unit category may be made up of more than one structure. *New Privately Owned Housing Units Authorized Unadjusted Units*[2] gives a conversion factor to determine the ratio of structures to units in the 5 or more unit category. For example if a county has one 40 unit apartment building, the ratio would be 40/1. If there are 5 different 8 unit buildings in the same project, the ratio would be 40/5. Structures started by category are then calculated at a regional level. The table *Annual Housing Units Authorized by Building Permit*[3] has 2007 data at the county level to allocate regional housing starts to the county level. This results in county level housing starts by number of units. The following surface areas were assumed disturbed for each unit type:

Table 1: Surface Acres Disturbed per Unit Type

1-Unit	1/4 acre/structure
2-Unit	1/3 acre/structure
Apartment	1/2 acre/structure

The 3-4 unit and 5 or more unit categories were considered to be apartments. Multiplication of housing starts to surface acres disturbed results in total number of acres disturbed for each unit category.

Acres Disturbed from Non-Residential Construction

Annual Value of Construction Put in Place in the U.S[4] has the 2008 National Value of Non-residential construction. The national value of non-residential construction put in place (in millions of dollars) was allocated to counties using county-level non-residential construction (NAICS Code 2362) employment data obtained from *County Business Patterns*[5] *(CBP)*. Because some counties employment data was withheld due to privacy concerns, the following procedure was adopted:

1. State totals for the known county level employees were subtracted from the number of employees reported in the state level version of CBP. This results in the total number of withheld employees in the state.

2. A starting guess of the midpoint of the range code was used (so for instance in the 1-19 employees range, a guess of 10 employees would be used) and a state total of the withheld counties was computed.

3. A ratio of guessed employees (Step 2) to withheld employees (Step 1) was then used to adjust the county level guesses up or down so the state total of adjusted guesses should match state total of withheld employees (Step 1)

In 1999 a figure of 2 acres/10^6 was developed. The Bureau of Labor Statistics *Producer Price Index*[6] lists costs of the construction industry from 1999-2007.

2007 acres per 10^6 = 1999 acres per 10^6 x (1999 PPI / 2007 PPI)
= 2 acres/10^6 (132.9 / 204.3)
= 1.301 acres per 10^6

Acres Disturbed by Road Construction

The Federal Highway Administration has *Highway Statistics, Section IV - Highway Finance, Table SF-12A, State Highway Agency Capital Outlay*[7] for 2006 which outlines spending by state in several different categories. For this SCC, the following columns are used: New Construction, Relocation, Added Capacity, Major Widening, and Minor Widening. These columns are also differentiated according to the following six classifications:

1. Interstate, urban
2. Interstate, rural
3. Other arterial, urban
4. Other arterial, rural
5. Collectors, urban
6. Collectors, rural

The State expenditure data are then converted to new miles of road constructed using $/mile conversions obtained from the North Carolina Department of Transportation (NCDOT) in 2000. A conversion of $4 million/mile was applied to the interstate expenditures. For expenditures on other arterial and collectors, a conversion factor of $1.9 million/mile was applied, which corresponds to all other projects.

The new miles of road constructed are used to estimate the acreage disturbed due to road construction. The total area disturbed in each state was calculated by converting the new miles of road constructed to acres using an acres disturbed/mile conversion factor for each road type as given in Table 2 below:

Table 2: Spending per Mile and Acres Disturbed per Mile by Highway Type

Road Type	Thousand Dollars per mile	Acres Disturbed per mile
Urban Areas, Interstate	4000	15.2
Rural Areas, Interstate	4000	15.2
Urban Areas, Other Arterials	1900	15.2
Rural Areas, Other Arterials	1900	12.7
Urban Areas, Collectors	1900	9.8
Rural Areas, Collectors	1900	7.9

Residential building starts are used to allocate the state-level acres disturbed by road construction to the county.[3] A ratio of the number of building starts in each county to the total number of building starts in each state was applied to the state-level acres disturbed to estimate the total number of acres disturbed by road construction in each county.

Converting Acres Disturbed to Tons of Land Clearing Debris Burned

Version 2 of the Biogenic Emissions Land cover Database (BELD2) within EPA's Biogenic Emission Inventory System (BEIS) was used to identify the acres of hardwoods, softwoods, and grasses in each county. Table 3 presents the average fuel loading factors by vegetation type. The average loading factors for slash hardwood and slash softwood were adjusted by a factor of 1.5 to account for the mass of tree that is below the soil surface that would be subject to burning once the land is cleared.[8] Weighted average county-level loading factors were calculated by multiplying the average loading factors by the percent contribution of each type of vegetation class to the total land area for each county.

Table 3. Fuel Loading Factors by Vegetation Type

Vegetation Type	Unadjusted Average Fuel Loading Factor (Ton/acre)	Adjusted Average Fuel Loading Factor (Ton/acre)

Vegetation Type	Unadjusted Average Fuel Loading Factor (Ton/acre)	Adjusted Average Fuel Loading Factor (Ton/acre)
Hardwood	66	99
Softwood	38	57
Grass	4.5	Not Applicable

The total acres disturbed by all construction types was calculated by summing the acres disturbed from residential, non-residential, and road construction. The county-level total acres disturbed were then multiplied by the weighted average loading factor to derive tons of land clearing debris in 2008.

c. Controls

Controls for land clearing debris burning are generally in the form of a ban on open burning of waste in a given municipality or county. Counties that were more than 80% urban were assumed not to practice any open burning. Therefore, criteria pollutant and HAP emissions from open burning of land clearing debris are zero in these counties. In addition, the State of Colorado implemented a state-wide ban on open burning. Emissions from open burning of land clearing debris in all Colorado counties were assumed to be zero.

d. Emission Factors

Emission factors are reported in Table 4 below. Emission factors for CAPs were developed by the U.S. Environmental Protection Agency (EPA) in consultation with the Eastern Regional Technical Advisory Committee and based primarily on the AP-42 report.[9,10] Emission factors for HAPs are from an EPA Control Technology Center report and emission factors for 17 dioxin congeners were obtained from an EPA dioxin report.[11,12] The Dioxin emission factors were multiplied by 0.002 to convert from mg/kg to lb/ton.

e. Emissions

County-level criteria pollutant and HAP emissions (in lb/year) were calculated by multiplying the total mass of land clearing debris burned per year by an emission factor.

f. Example Calculations

VOC emissions in Autauga County, Alabama from open burning of land clearing debris:

Rural fraction of Autauga County population = 0.448, so no emission controls

Acres disturbed by residential, non-residential, and road construction in Autauga County = 434.26
Weighted average fuel loading factor for Autauga County = 65.48 tons/acre

Mass of land clearing debris burned = 434.26 acres * 65.48 tons/acre = 28,437 tons

VOC emission factor = 11.6 lbs/ton
Factor to convert from lbs to tons = 1/2000

VOC emissions = tons of land clearing debris burned * VOC emission factor

VOC emissions from land clearing debris burning = 28,437 tons * 11.6 lbs/ton * 1 ton/2000 lbs

VOC emissions from land clearing debris burning in Autauga County in 2008 = 165 tons

g. References

1. U.S. Census Bureau, "New Privately Owned Housing Units Started for 2008 (Not seasonally adjusted)," available at http://www.census.gov/const/startsua.pdf

2. U.S. Census Bureau, "Table 2au. New Privately Owned Housing Units Authorized Unadjusted Units for Regions, Divisions, and States, Annual 2007" available at http://www.census.gov/const/C40/Table2/tb2u2007.txt

3. Annual Housing Units Authorized by Building Permits CO2007A, purchased from US Department of Census

4. U.S. Census Bureau, "Annual Value of Construction Put in Place," available at http://www.census.gov/const/www/ototpage.html

5. U.S. Census Bureau, "County Business Patterns," available at http://www.census.gov/econ/cbp/index.html

6. Bureau of Labor Statistics, Producer Price Index, Table BMNR, available at http://www.bls.gov/data/

7. Federal Highway Administration, 2006 Highway Spending, available at http://www.fhwa.dot.gov/policy/ohim/hs06/xls/sf12a.xls

8. Ward, D.E., C.C. Hardy, D.V. Sandberg, and T.E. Reinhardt. "Mitigation of Prescribed Fire Atmospheric Pollution through Increased Utilization of Hardwoods, Piled Residues, and Long-Needled Conifers." Final Report. USDA Forest Service, Pacific Northwest Research Station, Fire and Air Resource Management. 1989.

9. Huntley, Roy, U.S. Environmental Protection Agency, "state_comparison ERTAC SS_version7_3 Oct 20 2009 [electronic file]," November 5, 2009.

10. U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards. *Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources, Section 2.5 Open Burning*. Research Triangle Park, NC. October 1992.

11. U.S. Environmental Protection Agency, "Evaluation of Emissions from the Open Burning of Household Waste in Barrels, EPA-600/R-97-134a," Control Technology

Center. November 1997.

12. Gullet, B.K. and T. Abderrahmne, "PCDD/F Emissions from Forest Fire Simulations," *Atmospheric Environment*, Vol. 37, No. 6, pp. 803-813. February 2003.

3.2.3.18 Open Burning – Residential Household Waste

a. Source Category Description

Open burning of residential municipal solid waste (MSW) is the purposeful burning of MSW in outdoor areas. Criteria air pollutant (CAP) and hazardous air pollutant (HAP) emission estimates for MSW burning are a function of the amount of waste burned per year.

For this source category, the following SCC was assigned:

SCC	SCC Level 1	SCC Level 2	SCC Level 3	SCC Level 4
2610030000	Waste Disposal, Treatment, and Recovery	Open Burning	Residential	Household Waste (use 26-10-000-xxx for Yard Wastes)

b. Activity Data

The amount of household MSW burned was estimated using data from EPA's report *Municipal Solid Waste in the United States: 2007 Facts and Figures*.[1] The report presents the total mass of waste generated in the United States by type of waste for the calendar year 2007. This information was used to calculate a daily estimate of the per capita household waste subject to burning, 3.40 lbs/person/day. Non-combustible waste, such as glass and metals, was not considered to be waste subject to burning. Burning of yard waste is included in SCC 2610000100 and SCC 2610000400; therefore, it is not part of residential MSW. Approximately 25 to 32 percent of all waste that is subject to open burning is actually burned.[2] A median value of 28 percent is assumed to be burned in all counties in the United States.

Since open burning is generally not practiced in urban areas, only the rural population of each county was assumed to practice open burning. The ratio of urban to rural population was obtained from 2000 U.S. Census data.[3] This ratio was then multiplied by the 2008 U.S. Census Bureau estimate of the population in each county to obtain the county-level rural population for 2008.[4] The county-level rural population was then multiplied by the per capita household waste subject to burning to determine the amount of rural household MSW generated in each county in 2008.

c. Controls

Controls for residential MSW burning are generally in the form of a ban on open burning of waste in a given municipality or county. Counties that were more than 80% urban were assumed not to practice any open burning. Therefore, criteria pollutant and HAP emissions from residential municipal solid waste burning are zero in these counties. In addition, the State of Colorado implemented a state-wide ban on open burning. Emissions from open burning of residential waste in all Colorado counties were assumed to be zero.

d. Emission Factors

Emission factors are reported in Table 1 below. Emission factors for CAPs were developed by the U.S. Environmental Protection Agency (EPA) in consultation with the Eastern Regional Technical Advisory Committee and based primarily on the AP-42 report.[5,6] Emission factors for

HAPs are from an EPA Control Technology Center report and emission factors for 17 dioxin congeners were obtained from an EPA dioxin report.[7,8]

e. Emissions

County-level criteria pollutant and HAP emissions were calculated by multiplying the total amount of residential municipal solid waste burned per year by an emission factor.

f. Example Calculations

VOC emissions in Autauga County, Alabama from open burning of residential MSW:

Population of Autauga County in 2008 = 50,364
Rural fraction of Autauga County population = 0.448
Per capita MSW waste generated (lb/person/day) = 3.40
Fraction of rural population that burns MSW = 0.28
Number of days in a year = 365
Factor to convert from lbs to tons = 1/2000

2008 MSW burning activity in Autauga County = 50,364 * 0.448 * 3.40 * 0.28 * 365 * 1/2000

2008 leaf burning activity in Autauga County = 3,921 tons

VOC emissions = tons of leaves burned * VOC emission factor

VOC emission factor = 8.56 lb/ton

VOC emissions from leaf burning in Autauga County in 2008 = 3,921 tons * 8.56 lbs/ton * 1 ton/2000 lbs

VOC emissions from leaf burning in Autauga County in 2008 = 16.78 tons

g. References

1. U.S. Environmental Protection Agency, *Municipal Solid Waste in the United States: 2007 Facts and Figures*, EPA530-R-08-010, Office of Solid Waste and Emergency Response. November 2008. Available at http://www.epa.gov/epawaste/nonhaz/municipal/pubs/msw07-rpt.pdf

2. U.S. Environmental Protection Agency, Region V. "Emission Characteristics of Burn Barrels." Prepared by Two Rivers Regional Council of Public Officials and Patrick Engineering, Inc. June 1994.

3. U.S. Census Bureau, Decennial Censuses, 2000 Census: SF1, Table P2

4. U.S. Census Bureau. *Annual Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico: April 1, 2000 to July 1, 2008 (NST-EST2008-01).* Available at http://www.census.gov/popest/states/NST-ann-est.html

5. Huntley, Roy, U.S. Environmental Protection Agency, "state_comparison ERTAC SS_version7_3 Oct 20 2009 [electronic file]," November 5, 2009.

6. United States Environmental Protection Agency, Office of Air Quality Planning and Standards. *Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources, Section 2.5 Open Burning*. Research Triangle Park, NC. October 1992.

7. U.S. Environmental Protection Agency, Control Technology Center. "Evaluation of Emissions from the Open Burning of Household Waste in Barrels." EPA-600/R-97-134a. November 1997.

8. United States Environmental Protection Agency, Office of Research and Development. *Exposure and Human Health Reassessment of 2,3,7,8-Tetrachlorodibenzeno-p-Dioxin (TCCD) and Related Compounds. Part I: Estimating Exposure to Dioxin-Like Compounds. Volume 2: Sources of Dioxin-Like Compounds in the United States*. EPA/600/P-00/001Ab. Washington D.C. March 2001.

Table 1. Emission Factors for Open Burning of Residential MSW (2610030000)

Pollutant	Pollutant Code	Emission Factor (lb/ton)	Emission Factor Reference
CO	CO	8.50E+01	Reference 5
NOX	NOX	6.00E+00	Reference 5
PM10-FIL	PM10-FIL	3.80E+01	Reference 5
PM10-PRI	PM10-FIL	3.80E+01	Reference 5
PM25-FIL	PM25-FIL	3.48E+01	Reference 5
PM25-PRI	PM25-FIL	3.48E+01	Reference 5
SO2	SO2	1.00E+00	Reference 5
VOC	VOC	8.56E+00	Reference 5
1,2,3,4,6,7,8-heptachlorodibenzofuran	67562394	2.48E-07	Reference 8
1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin	35822469	7.96E-08	Reference 8
1,2,3,4,7,8,9-heptachlorodibenzofuran	55673897	3.00E-08	Reference 8
1,2,3,4,7,8-hexachlorodibenzofuran	70648269	2.28E-07	Reference 8
1,2,3,4,7,8-hexachlorodibenzo-p-dioxin	39227286	1.28E-08	Reference 8
1,2,3,6,7,8-hexachlorodibenzofuran	57117449	7.70E-08	Reference 8
1,2,3,6,7,8-hexachlorodibenzo-p-dioxin	57653857	1.94E-08	Reference 8
1,2,3,7,8,9-hexachlorodibenzofuran	72918219	5.00E-09	Reference 8
1,2,3,7,8,9-hexachlorodibenzo-p-dioxin	19408743	3.80E-08	Reference 8
1,2,3,7,8-pentachlorodibenzofuran	57117416	7.44E-08	Reference 8
1,2,3,7,8-pentachlorodibenzo-p-dioxin	40321764	1.62E-08	Reference 8
1,2,4-trichlorobenzene	120821	2.20E-04	Reference 7
1,4-dichlorobenzene	106467	3.20E-04	Reference 7
2,3,4,6,7,8-hexachlorodibenzofuran	60851345	1.24E-07	Reference 8
2,3,4,7,8-pentachlorodibenzofuran	57117314	1.30E-07	Reference 8
2,3,7,8-tetrachlorodibenzofuran	51207319	9.12E-08	Reference 8
2,3,7,8-tetrachlorodibenzo-p-dioxin	1746016	5.40E-09	Reference 8
Acenaphthene	83329	1.54E-03	Reference 7
Acenaphthylene	208968	2.26E-02	Reference 7
Anthracene	120127	3.66E-03	Reference 7
Benz[a]anthracene	56553	4.48E-03	Reference 7
Benzene	71432	2.48E+00	Reference 7
Benzo[a]pyrene	50328	4.24E-03	Reference 7
Benzo[b]fluoranthene	205992	5.26E-03	Reference 7
Benzo[g,h,i,]Perylene	191242	3.95E-03	Reference 7
Benzo[k]fluoranthene	207089	2.05E-03	Reference 7
Chlorobenzene	108907	8.48E-04	Reference 7
Chrysene	218019	5.07E-03	Reference 7
Dibenzo[a,h]anthracene	53703	6.46E-04	Reference 7
Fluoranthene	206440	8.14E-03	Reference 7
Fluorene	86737	7.31E-03	Reference 7
Hexachlorobenzene	118741	4.40E-05	Reference 7
Hydrochloric Acid	7647010	5.68E-01	Reference 7
Hydrogen Cyanide	74908	9.36E-01	Reference 7
Indeno[1,2,3-c,d]pyrene	193395	3.75E-03	Reference 7
Naphthalene	91203	3.51E-02	Reference 7
Octachlorodibenzofuran	39001020	7.28E-08	Reference 8
Octachlorodibenzo-p-dioxin	3268879	9.94E-08	Reference 8
Pentachlorophenol	87865	1.06E-04	Reference 7

Pollutant	Pollutant Code	Emission Factor (lb/ton)	Emission Factor Reference
Phenanthrene	85018	1.46E-02	Reference 7
Phenol	108952	2.80E-01	Reference 7
Polychlorinated Biphenyls	1336363	5.72E-03	Reference 7
Pyrene	129000	9.66E-03	Reference 7
Styrene	100425	1.48E+00	Reference 7

Table 4. Emission Factors for Open Burning of Land Clearing Debris (SCC 2610000500)

Pollutant	Pollutant Code	Emission Factor (lb/ton)	Emission Factor Reference
VOC	VOC	1.16E+01	Reference 9
NOX	NOX	5.00E+00	Reference 9
CO	CO	1.69E+02	Reference 9
PM10-FIL	PM10-FIL	1.70E+01	Reference 9
PM25-FIL	PM25-FIL	1.70E+01	Reference 9
PM10-PRI	PM10-PRI	1.70E+01	Reference 9
PM25-PRI	PM25-PRI	1.70E+01	Reference 9
1,2,3,4,6,7,8-HpCDD	35822469	3.33E-07	Reference 12
1,2,3,4,6,7,8-HpCDF	67562394	5.08E-08	Reference 12
1,2,3,4,7,8,9-HpCDF	55673897	6.12E-09	Reference 12
1,2,3,4,7,8-HxCDD	39227286	1.14E-08	Reference 12
1,2,3,4,7,8-HxCDF	70648269	3.34E-08	Reference 12
1,2,3,6,7,8-HxCDD	57653857	2.14E-08	Reference 12
1,2,3,6,7,8-HxCDF	57117449	1.43E-08	Reference 12
1,2,3,7,8,9-HxCDD	19408743	3.47E-08	Reference 12
1,2,3,7,8,9-HxCDF	72918219	2.23E-09	Reference 12
1,2,3,7,8-PeCDD	40321764	7.66E-09	Reference 12
1,2,3,7,8-PeCDF	57117416	1.27E-08	Reference 12
2,3,4,6,7,8-HxCDF	60851345	1.96E-08	Reference 12
2,3,4,7,8-PeCDF	57117314	2.02E-08	Reference 12
2,3,7,8-TCDD	1746016	2.30E-09	Reference 12
2,3,7,8-TCDF	51207319	1.40E-08	Reference 12
Cumene	98828	1.33E-02	Reference 11
Dibenzofuran	132649	6.75E-03	Reference 11
Ethyl Benzene	100414	4.80E-02	Reference 11
Methyl Ethyl Ketone	78933	6.70E-02	Reference 11
OCDD	3268879	1.33E-06	Reference 12
OCDF	39001020	2.05E-08	Reference 12
Phenol	108952	1.15E-01	Reference 11
Styrene	100425	1.02E-01	Reference 11

3.2.3.19 Open Burning – Yard Waste – Leaf and Brush Species

a. Source Category Description

Open burning of yard waste is the purposeful burning of leaf and brush species in outdoor areas. Criteria air pollutant (CAP) and hazardous air pollutant (HAP) emission estimates for leaf and brush waste burning are a function of the amount of waste burned per year.

For this source category, the following SCCs were assigned:

SCC	SCC Level 1	SCC Level 2	SCC Level 3	SCC Level 4
2610000100	Waste Disposal, Treatment, and Recovery	Open Burning	All Categories	Yard Waste – Leaf Species Unspecified
2610000400	Waste Disposal, Treatment, and Recovery	Open Burning	All Categories	Yard Waste – Brush Species Unspecified

b. Activity Data

The amount of leaf and brush waste burned was estimated using data from EPA's report *Municipal Solid Waste in the United States: 2007 Facts and Figures.*[1] The report presents the total mass of waste generated in the United States by type of waste, including yard waste, for the calendar year 2007. This information was used to calculate a daily estimate of the per capita yard waste, 0.59 lbs/person/day. Of the total amount of yard waste generated, the yard waste composition was assumed to be 25 percent leaves, 25 percent brush, and 50 percent grass by weight.[2]

Open burning of grass clippings is not typically practiced by homeowners, and as such only estimates for leaf burning and brush burning were developed. Approximately 25 to 32 percent of all waste that is subject to open burning is actually burned.[2] A median value of 28 percent is assumed to be burned in all counties in the United States.

The per capita estimate was then multiplied by the 2008 population in each county that is expected to burn waste. Since open burning is generally not practiced in urban areas, only the rural population of each county was assumed to practice open burning. The ratio of urban to rural population was obtained from 2000 U.S. Census data.[3] This ratio was then multiplied by the 2008 U.S. Census Bureau estimate of the population in each county to obtain the county-level rural population for 2008.[4]

The percentage of forested acres from Version 2 of BELD2 within BEIS was used to adjust for variations in vegetation. The percentage of forested acres per county (including rural forest and urban forest) was then determined. To better account for the native vegetation that would likely be occurring in the residential yards of farming States, agricultural land acreage was subtracted before calculating the percentage of forested acres. Table 1 presents the ranges that were used to make adjustments to the amount of yard waste that is assumed to be generated per county. All municipios in Puerto Rico and counties in the U.S. Virgin Islands, Hawaii, and Alaska were assumed to have greater than 50 percent forested acres.

Table 1. Adjustment for Percentage of Forested Acres

Percent Forested Acres	Adjustment for

per County	Yard Waste Generated
< 10%	0% generated
>= 10%, and < 50%	50% generated
>= 50%	100% generated

c. Controls

Controls for yard waste burning are generally in the form of a ban on open burning of waste in a given municipality or county. Counties that were more than 80% urban were assumed not to practice any open burning. Therefore, criteria pollutant and HAP emissions from residential municipal solid waste burning are zero in these counties. In addition, the State of Colorado implemented a state-wide ban on open burning. Emissions from open burning of residential waste in all Colorado counties were assumed to be zero.

d. Emission Factors

Emission factors are specific to yard waste type and are reported in Tables 2 and 3 below. Emission factors for CAPs were developed by the U.S. Environmental Protection Agency (EPA) in consultation with the Eastern Regional Technical Advisory Committee.[5] Emission factors for HAPs are from AP-42 and an EPA Control Technology Center report.[6,7] Forest fire simulation emission factors were used to estimate emissions for 17 dioxin congeners.[8]

e. Emissions

County-level criteria pollutant and HAP emissions were calculated by multiplying the total amount of yard waste (either leaf or brush) burned per year by an emission factor. Emissions for leaves and residential brush were calculated separately, since emission factors vary by yard waste type. Tons of debris burned were converted to kilograms (kg) by multiplying by 907.18474.

f. Example Calculations

VOC emissions in Autauga County, Alabama from open burning of leaf waste:

Population of Autauga County in 2008 = 50,364
Rural fraction of Autauga County population = 0.448
Per capita waste yard waste generated (lb/person/day) = 0.59
Leaf fraction of waste = 0.25
Fraction of rural population that burns yard waste = 0.28
Adjustment factor based on % forested acres = 1
Number of days in a year = 365
Factor to convert from lbs to tons = 1/2000

2008 leaf burning activity in Autauga County = 50,364 * 0.448 * 0.59 * 0.25 * 0.28 * 1 * 365 * 1/2000

2008 leaf burning activity in Autauga County = 170.11 tons

VOC emissions = tons of leaves burned * VOC emission factor

VOC emission factor = 28 lb/ton

VOC emissions from leaf burning in Autauga County in 2008 = 170.11 tons * 28 lbs/ton * 1 ton/2000 lbs

VOC emissions from leaf burning in Autauga County in 2008 = 2.38 tons

g. References

1. U.S. Environmental Protection Agency, *Municipal Solid Waste in the United States: 2007 Facts and Figures*, EPA530-R-08-010, Office of Solid Waste and Emergency Response. November 2008. Available at http://www.epa.gov/epawaste/nonhaz/municipal/pubs/msw07-rpt.pdf

2. Two Rivers Regional Council of Public Officials and Patrick Engineering, Inc. "Emission Characteristics of Burn Barrels," prepared for the U.S. Environmental Protection Agency, Region V. June 1994.

3. U.S. Census Bureau, Decennial Censuses, 2000 Census: SF1, Table P2

4. U.S. Census Bureau. *Annual Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico: April 1, 2000 to July 1, 2008 (NST-EST2008-01).* Available at http://www.census.gov/popest/states/NST-ann-est.html

5. Huntley, Roy, U.S. Environmental Protection Agency, "state_comparison ERTAC SS_version7_3 Oct 20 2009 [electronic file]," November 5, 2009.

6. U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources, Section 2.5 Open Burning,, Tables 2.5-5 and 2.5-6. October 1992.

7. U.S. Environmental Protection Agency, *Evaluation of Emissions from the Open Burning of Household Waste in Barrels*, EPA-600/R-97-134a, Control Technology Center. November 1997.

8. Gullet, B.K. and T. Abderrahmne, "PCDD/F Emissions from Forest Fire Simulations," *Atmospheric Environment*, Vol. 37, No. 6, pp. 803-813. February 2003.

Table 2. Emission Factors for Open Burning of Leaf Species (SCC 2610000100)

Pollutant	Pollutant Code	Emission Factor (lb/ton)	Emission Factor Reference
1,2,3,4,6,7,8-heptachlorodibenzofuran	67562394	5.08E-08	Reference 8
1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin	35822469	3.32E-07	Reference 8
1,2,3,4,7,8,9-heptachlorodibenzofuran	55673897	6.12E-09	Reference 8
1,2,3,4,7,8-hexachlorodibenzofuran	70648269	3.34E-08	Reference 8
1,2,3,4,7,8-hexachlorodibenzo-p-dioxin	39227286	1.136E-08	Reference 8

1,2,3,6,7,8-hexachlorodibenzofuran	57117449	1.428E-08	Reference 8
1,2,3,6,7,8-hexachlorodibenzo-p-dioxin	57653857	2.14E-08	Reference 8
1,2,3,7,8,9-hexachlorodibenzofuran	72918219	2.22E-09	Reference 8
1,2,3,7,8,9-hexachlorodibenzo-p-dioxin	19408743	3.46E-08	Reference 6
1,2,3,7,8-pentachlorodibenzofuran	57117416	1.268E-06	Reference 8
1,2,3,7,8-pentachlorodibenzo-p-dioxin	40321764	7.66E-09	Reference 8
2,3,4,6,7,8-hexachlorodibenzofuran	60851345	1.962E-08	Reference 8
2,3,4,7,8-pentachlorodibenzofuran	57117314	2.02E-08	Reference 8
2,3,7,8-tetrachlorodibenzofuran	51207319	1.396E-08	Reference 8
2,3,7,8-tetrachlorodibenzo-p-dioxin	1746016	2.3E-09	Reference 6
CO	CO	112	Reference 5
Cumene	98828	0.01325	Reference 7
Ethyl Benzene	100414	0.048	Reference 6
Methyl Ethyl Ketone	78933	0.067	Reference 8
Nitrogen Oxides	NOX	6.2	Reference 5
Octachlorodibenzofuran	39001020	2.06E-08	Reference 8
Octachlorodibenzo-p-dioxin	3268879	1.328E-06	Reference 6
Phenol	108952	0.115	Reference 6
PM10-FIL	PM10-FIL	22	Reference 5
PM10-PRI	PM10-PRI	22	Reference 5
PM25-FIL	PM25-FIL	22	Reference 5
PM25-PRI	PM25-PRI	22	Reference 5
Styrene	100425	0.1015	Reference 6
Sulfur Dioxide	SO2	0.76	Reference 5
VOC	VOC	28	Reference 5

Table 3. Emission Factors for Open Burning of Brush Species (SCC 2610000400)

Pollutant	Pollutant Code	Emission Factor (lb/ton)	Emission Factor Reference
CO	CO	140	Reference 5
Nitrogen Oxides	NOX	5	Reference 5
PM10-PRI	PM10-PRI	19.73	Reference 5
PM10-FIL	PM10-FIL	19.73	Reference 5
PM25-PRI	PM25-PRI	15.21	Reference 5
PM25-FIL	PM25-FIL	15.21	Reference 5
Sulfur Dioxide	SO2	1.66	Reference 5
VOC	VOC	19	Reference 5
1,2,3,4,6,7,8-heptachlorodibenzofuran	35822469	3.32E-07	Reference 6
1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin	67562394	5.08E-08	Reference 6
1,2,3,4,7,8,9-heptachlorodibenzofuran	55673897	6.12E-09	Reference 6
1,2,3,4,7,8-hexachlorodibenzofuran	70648269	3.34E-08	Reference 6
1,2,3,4,7,8-hexachlorodibenzo-p-dioxin	39227286	1.136E-08	Reference 6
1,2,3,6,7,8-hexachlorodibenzofuran	57117449	1.428E-08	Reference 6
1,2,3,6,7,8-hexachlorodibenzo-p-dioxin	57653857	2.14E-08	Reference 8
1,2,3,7,8,9-hexachlorodibenzofuran	72918219	2.22E-09	Reference 8
1,2,3,7,8,9-hexachlorodibenzo-p-dioxin	19408743	3.46E-08	Reference 8

Pollutant	Pollutant Code	Emission Factor (lb/ton)	Emission Factor Reference
1,2,3,7,8-pentachlorodibenzofuran	57117416	1.268E-06	Reference 8
1,2,3,7,8-pentachlorodibenzo-p-dioxin	40321764	7.66E-09	Reference 8
2,3,4,6,7,8-hexachlorodibenzofuran	60851345	1.962E-08	Reference 8
2,3,4,7,8-pentachlorodibenzofuran	57117314	2.02E-08	Reference 8
2,3,7,8-tetrachlorodibenzofuran	51207319	1.396E-08	Reference 8
2,3,7,8-tetrachlorodibenzo-p-dioxin	1746016	2.3E-09	Reference 8
Cumene	98828	0.01325	Reference 8
Ethyl Benzene	100414	0.048	Reference 8
Methyl Ethyl Ketone	78933	0.067	Reference 8
Octachlorodibenzofuran	39001020	2.06E-08	Reference 8
Octachlorodibenzo-p-dioxin	3268879	1.328E-06	Reference 8
Phenol	108952	0.115	Reference 7
Styrene	100425	0.1015	Reference 7

3.2.3.20 Agricultural Production – Crops – Fertilizer

a. Source Category Description

Fertilizer in this category refers to any nitrogen-based compound, or mixture containing such a compound, that is applied to land to improve plant fitness.

The approach to calculating emissions for the assigned SCCs consisted of three general steps, as follows:

- Calculating the percent change in county-level fertilizer quantities applied between 2002 and 2007.
- Using the percent change in applied fertilizer quantity to grow the fertilizer activity files provided with the CMU Ammonia Model v.3.6.[1]
- Running the CMU Ammonia Model to calculate ammonia emissions based on the updated county-level fertilizer quantities.

For this source category, the following SCCs were assigned:

SCC	Descriptor 2	Descriptor 4	Descriptor 5	Descriptor 10
2801700001	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Anhydrous Ammonia
2801700002	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Aqueous Ammonia
2801700003	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Nitrogen Solutions
2801700004	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Urea
2801700005	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Ammonium Nitrate
2801700006	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Ammonium Sulfate
2801700007	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Ammonium Thiosulfate
2801700010	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	N-P-K (multi-grade nutrient fertilizers)

2801700011	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Calcium Ammonium Nitrate
2801700012	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Potassium Nitrate
2801700013	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Diammonium Phosphate
2801700014	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Monoammonium Phosphate
2801700015	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Liquid Ammonium Polyphosphate
2801700099	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Miscellaneous Fertilizers

b. Activity Data

County-level fertilizer consumption data for 2002 and 2007 was obtained from the Fertilizer Institute's Commercial Fertilizers 2002 and 2007 reports.[2] The consumption data includes total fertilizer sales or shipments for farm and non-farm use and is reported semi-annually for the fiscal year. To make the fertilizer types listed in the Commercial Fertilizers reports match the activity input files from the CMU Ammonia Model, the fertilizer types were grouped according to Table 1 below. For any state in 2002 reporting fertilizer quantities from unknown counties, the quantities were apportioned to every county in the state based on cropland area obtained from the U.S. Department of Agriculture's 2002 Census of Agriculture.[3] Similarly for 2007, fertilizer quantities from unknown counties were apportioned based on cropland area reported in the 2007 Census of Agriculture.[4] For each fertilizer group, the percent difference in fertilizer consumption between 2002 and 2007 was calculated for each county. These percentages were used to grow the 2002 county-level nitrogen quantities from the fertilizer activity files provided with the CMU Ammonia Model v.3.6.

The average nitrogen content for each fertilizer group, reported in Table 2, was calculated by summing the county-level fertilizer quantities for all counties from the CMU Ammonia Model activity files to generate total nitrogen applied. For each fertilizer group, the total nitrogen applied was then divided by the 2002 fertilizer consumption data from the 2002 Commercial Fertilizers report to obtain the percent nitrogen content for each fertilizer group. For any county with fertilizer consumption in 2007, but not in 2002, the fertilizer quantity obtained from the 2007 Commercial Fertilizer's report was multiplied by the percent nitrogen content of each fertilizer group to determine tons of nitrogen. The tons of nitrogen were then converted to kilograms and allocated temporally by month according to the state-level percentage of total

fertilizer in that group applied each month. The state-level percentage was calculated using data in the CMU Ammonia Model input files.

c. Emission Factors

Emission factors for each fertilizer group were provided with the CMU Ammonia Model and are reported in Table 3 below.[3]

d. Emissions

The fertilizer activity files provided with the CMU Ammonia Model v.3.6 were replaced with the updated county-level fertilizer files. County-level ammonia emissions were then calculated by running the model. The model corrects for the difference in mass between nitrogen and ammonia.

N applied x % N volatilized as NH_3 x 17 g /14 g = NH_3 emissions

e. Sample Calculations

Allocation of Fertilizer Quantities from Unknown Counties

From the 2007 Commercial Fertilizers report, Colorado reported 4,774,000 kg of ammonium nitrate from unknown counties for January through June of 2007. This quantity was distributed to counties based on the percent of cropland in the state located in each county. For example, Colorado has 11,484,000 acres of cropland. Adams County, Colorado has 547,000 acres of cropland.

Percent of cropland in CO located in Adams County = (547,000 / 11,484,000) x 100 = 4.76

Ammonium nitrate allocated to Adams County = 4,774,000 kg x .0476 = 227,240 kg

Growing the CMU Ammonia Model Input Files

After allocating fertilizer data from unknown counties for 2002 and 2007, the county-level percent difference between fertilizer quantity applied in 2002 and 2007 was used to grow the data in the activity files provided with the CMU Ammonia Model. For example, Autauga County, Alabama applied 473,180 kg of ammonium nitrate from July 2001 through December 2001 and 516,240 kg from July 2006 through December 2006.

Percent change in ammonium nitrate applied = (516,240 kg / 473,180 kg) x 100 = 109

The quantity of nitrogen, in the form of ammonium nitrate, applied per month from July through December 2002 in Autauga County was extracted from the CMU Ammonia Model activity files and multiplied by the percent change.

July: 3,250 kg x 1.09 = 3,543 kg N

August: 3,210 kg x 1.09 = 3,499 kg N

September: 9,640 kg x 1.09 = 10,508 kg N

October: 6,320 kg x 1.09 = 6,889 kg N

November: 2,600 kg x 1.09 = 2,834 kg N

December: 1,380 kg x 1.09 = 1,504 kg N

Calculation of Nitrogen Content in a Fertilizer Group

The sum of all nitrogen applied in the form of ammonium nitrate from the CMU Ammonia Model ammonium nitrate activity file was 508,000,000 kg. From the 2002 Commercial Fertilizers report, the total quantity of ammonium nitrate applied in 2002 was 1,420,000,000 kg.

N content of ammonium nitrate = (508,000,000 kg / 1,420,000,000 kg) x 100 = 36 %

County Where Fertilizer was Applied in 2007, but not in 2002

In Meade County, Kentucky, there was no ammonium nitrate applied from January to June of 2002, but there were 356,705 kg applied from January to June of 2007. To convert to kg of nitrogen, the quantity of ammonium nitrate applied in 2007 was multiplied by the nitrogen content of ammonium nitrate.

N applied = 356,705 kg x 0.36 = 128,414 kg

The quantity of nitrogen was then allocated temporally by month from January to June based on the state-level distribution of nitrogen applied in the form of ammonium nitrate from the CMU Ammonia Model ammonium nitrate activity file. Total nitrogen in the form of ammonium nitrate applied in Kentucky from January through June of 2002 was 17,000,000 kg. The total for January was 289,000 kg. The total for February was 745,000 kg.

January: (289,000 kg / 17,000,000 kg) x 128,414 kg = 2,183 kg N applied in Meade County

February: (745,000 kg / 17,000,000 kg) x 128,414 kg = 5,600 kg N applied in Meade County

March – June: calculated same as above.

f. References

1. Cliff Davidson, Peter Adams, Ross Strader, Rob Pinder, Natalie Anderson, Marian Goebes, and Josh Ayers. The Environmental Institute, Carnegie Mellon University, *CMU Ammonia Model v.3.6*., 2004, at http://www.cmu.edu/ammonia/, accessed 25 April 2009.

2. Association of American Plant Food Control Officials in partnership with The Fertilizer Institute, *Commercial Fertilizers 2002* and *Commercial Fertilizers 2007*, at http://www.aapfco.org/aapfcopubs.html, accessed 2 May 2009.

3. U.S. Department of Agriculture, *2002 Census of Agriculture*, at http://www.agcensus.usda.gov/, accessed 30 April 2009.

4. 4. U.S. Department of Agriculture, *2007 Census of Agriculture*, at http://www.agcensus.usda.gov/, accessed 30 April 2009.

Table 1. Fertilizers Assigned to Fertilizer Groups

CMU Ammonia Model Fertilizer Group	Commercial Fertilizers Report - Fertilizer Code	Description 1	Description 2
Ammonium Nitrate	10	Ammonium Nitrate	Ammoniumnitrate
Ammonium Sulfate	24	Ammonium Sulfate	Ammoniumsulfate
Ammonium Thiosulfate	31	Ammonium Thiosulfate	Ammoniumthiosul
Anhydrous Ammonia	2	Anhydrous Ammonia	Anhy Ammonia
Aqueous Ammonia	6	Aqua Ammonia	Aqua Ammonia
Calcium Ammonium Nitrate	35	Calcium Ammonium Nit	Calcium Amm Nit
Diammonium Phosphate	203	Diammonium Phosphate	DAP
Liquid Ammonium Polyphosphate	249	Liquid Ammonium Poly	Liq Amm Poly
Miscellaneous	12	Ammonium Nitrate Sol	Amm Nit Solution
	13	Ammonium Nitrate-Lim	Amm Nit Lime Mix
	16	Ammonium Nitrate-Sul	Ammoniumnit-Sul
	20	Ammonium Polysulfide	Ammoniumpolysulf
	25	Ammonium Sulfate Sol	Amm Sul Solution
	27	Ammonium Sulfate-Nit	Ammoniumsul-Nit

CMU Ammonia Model Fertilizer Group	Commercial Fertilizers Report - Fertilizer Code	Description 1	Description 2
	29	Ammonium Sulfate-Ure	Ammoniumsul-Urea
	46	Calcium Nitrate-Urea	Calcium Nit-Urea
	52	Magnesium Nitrate	Magnesium Nit
	54	Nitric Acid	Nitric Acid
	62	Sodium Nitrate	Sodium Nitrate
	64	Sulfur Coated Urea	Sul Ctd Urea
	67	Urea Solution	Urea Solution
	68	Urea-Formaldehyde	Urea-Form
	97	Nitrogen Product - C	Nitrogen No Code
	98	Nitrogen Product - C	Nitrogen No Id
	201	Ammonium Metaphospha	Ammoniummetaphos
	202	Ammonium Phosphate	Ammoniumphos
	204	Ammonium Polyphospha	Ammoniumpoly
	206	Ammonium Phosphate N	Amm Phosnitrate
	207	Ammonium Phosphate S	Amm Phossulfate
	241	Nitric Phosphate	Nitric Phos
	413	Manure Salts	Manure Salts
	458	Potassium-Sodium Nit	Pot-Sod Nitrate
	617	Fish Scrap	Fish Scrap
	629	Guano	Guano
	649	Manure	Manure
	652	Peat	Peat
	661	Sewage Sludge, Activ	Act Sew Sludge
	663	Sewage Sludge, Diges	Dig Sew Sludge
	665	Sewage Sludge, Heat	Ht Driedsew Slge
	667	Sewage Sludge, Other	Oth Sew Sludge
	671	Soybean Meal	Soybean Meal
	673	Tankage, Animal	Animal Tankage
	675	Tankage, Process	Process Tankage
	697	Natural Organic Prod	Nat Org No Code
	698	Nat Organic Product	Nat Org No Id
	764	Soil Amendment	Soil Amendmnt
	766	Soil Conditioner	Soil Cond
	767	Potting Soil	Potting Soil
	797	Sec./Micronut. - Cod	Sec/Mic No Code
	798	Sec./Micronut. - Cod	Sec/Mic No Id
	978	Fertilizer Product -	Fert No Id
	988	Single Nutrient - Co	Sgle-Nu No Id
Mix	0	Identified By Grade	Ident. By Grade
	998	Multiple Nutrient -	Mult-Nut No Grade
Monoammonium Phosphate	209	Monoammonium Phosphate	Monoamm Phos

CMU Ammonia Model Fertilizer Group	Commercial Fertilizers Report - Fertilizer Code	Description 1	Description 2
Nitrogen Solutions	56	Nitrogen Solution <28%	Nitrogensol <28%
	58	Nitrogen Solution 28%	Nitrogensol 28%
	59	Nitrogen Solution 30%	Nitrogensol 30%
	60	Nitrogen Solution 32%	Nitrogensol 32%
	61	Nitrogen Solution >32%	Nitrogensol >32%
Potassium Nitrate	453	Potassium Nitrate	Pot Nitrate
Urea	66	Urea	Urea

Table 2. Fertilizer Nitrogen Content

Fertilizer	Nitrogen Content (percent)
Ammonium Nitrate	36
Ammonium Sulfate	22
Ammonium Thiosulfate	12
Anhydrous Ammonia	82
Aqueous Ammonia	21
Calcium Ammonium Nitrate	17
Diammonium Phosphate	18
Liquid Ammonium Polyphosphate	10
Miscellaneous	8
Mix	12
Monoammonium Phosphate	11
Nitrogen Solutions	29
Potassium Nitrate	14
Urea	46

Table 3. Fertilizer Emission Factors

Fertilizer Description	Pollutant Code	Emission Factor (varies by county for some fertilizers)			Emission Factor Unit	Emission Factor Reference
		Min	Max	Average		
Ammonium Nitrate	NH3	1.0	3.0	1.91	% N volatilized as NH3	1
Ammonium Sulfate	NH3	5.0	15.0	9.53	% N volatilized as NH3	1
Ammonium Thiosulfate	NH3	2.5	2.5	2.5	% N volatilized as NH3	1
Anhydrous Ammonia	NH3	4.0	4.0	4.0	% N volatilized as NH3	1
Aqueous Ammonia	NH3	4.0	4.0	4.0	% N volatilized as NH3	1
Calcium Ammonium Nitrate	NH3	1.0	3.0	1.91	% N volatilized as NH3	1
Diammonium Phosphate	NH3	5.0	5.0	5.0	% N volatilized as NH3	1
Liquid Ammonium Polyphosphate	NH3	5.0	5.0	5.0	% N volatilized as NH3	1
Miscellaneous Fertilizers	NH3	6.0	8.0	6.59	% N volatilized as NH3	1
Monoammonium Phosphate	NH3	5.0	5.0	5.0	% N volatilized as NH3	1
Nitrogen Solutions	NH3	8.0	8.0	8.0	% N volatilized as NH3	1
N-P-K (multi-grade nutrient fertilizers)	NH3	1.0	3.0	1.91	% N volatilized as NH3	1
Potassium Nitrate	NH3	2.0	2.0	2.0	% N volatilized as NH3	1
Urea	NH3	15.0	20.0	15.8	% N volatilized as NH3	1

3.2.3.21 Publicly Owned Treatment Works

a. Source Category Description

Publicly Owned Treatment Works (POTW) means a treatment works that is owned by a state, municipality, city, town, special sewer district, or other publicly owned and financed entity as opposed to a privately (industrial) owned treatment facility. The definition includes intercepting sewers, outfall sewers, sewage collection systems, pumping, power, and other equipment. The wastewater treated by these POTWs is generated by industrial, commercial, and domestic sources.[1]

The general approach to calculating emissions for POTWs is to estimate the 2008 national POTW flow rate using methods described below and then multiply the estimated flow rate by the emission factors for VOCs, ammonia, and 53 HAPs. The emissions are allocated to the county level using methods described below.

b. Activity Data

A nationwide projected flow rate in 2010 of 39,780 million gallons per day (MMGD) was available from an EPA report.[2] Of this, POTWs account for 98.5 percent of the flow rate or 39,180 MMGD, with privately owned treatment works accounting for the rest. The EPA Clean Watersheds Needs Survey reports the existing flow rate in 2004 for POTWs as 34,370 MMGD.[3] The interpolated 2008 nationwide flow rate (using a linear regression) was calculated at 37,580 MMGD, or 13,754,280 million gallons annually. The nationwide flow rate includes Puerto Rico and the U.S. Virgin Islands.

c. Emission Factors

The ammonia emission factor was obtained from a report to EPA[4], while the VOC emission factor was based on a TriTAC study.[5] Emission factors for the 53 HAPs were derived using 1996 area source emissions estimates that were provided by ESD[6] and the 1996 nationwide flow rate.[7] These HAP emission factors were then multiplied by the 2008 to 2002 VOC emission factor ratio (0.85/9.9) to obtain the final HAP emission factors applied in the 2008 inventory. The emission factors, pollutant codes, and pollutant descriptions are reported in Table 1.

d. Emissions

Emissions were allocated to the county-level by the county proportion of the U.S. population.[8]

It is important to note that the emission estimates for this category represent total emissions. It may be necessary to determine whether there are point source emissions in SCCs 50100701 through 50100781 and 50100791 through 50182599 that need to be subtracted to yield the nonpoint source emission estimates for this category.

Though there are two point source facilities in Missouri that are POTW's, their emissions were not subtracted from the area source category due to time constraints and small level of emissions compared to the area source category.

e. Sample Calculations:

The 1996 flow rate per day was 32,175 MMGD. (1996 was a leap year.) Annually, this computes to:

32,175 MMGD treated * 366 days = 11,776,050 million gallons treated

Benzene emissions in 1996 for area source POTWs were estimated to be 461.44 tons per year. The derived benzene emission factor is calculated as follows:

Benzene emission factor = ((461.44 tons * 2000 lb/ton) / (11,776,050 million gallons treated)) * (0.85/9.9)

Benzene emission factor = 0.0067287 lb/million gallons treated

Benzene emissions for 2008 for area source POTWs are calculated as follows:

2008 Benzene emissions = (37,580 MMGD * 366 days) * (0.0067287 lb/million gallons treated)

2008 Benzene emissions = 92,548 pounds / 2,000 pounds = 46.27 tons/year

Total national 2008 benzene emissions from area source POTWs are allocated to county-level by the county proportion of the U.S. population. The total U.S. population in 2008 is 308,123,578. Benzene emissions for Autauga County, Alabama (2008 population of 50,364) are calculated as follows:

2008 emissions = 46.27 tons/year * 50,364/308,123,578 = 0.0076 tons/year

f. References

1. U.S. Environmental Protection Agency, 64FR57572, National Emission Standards for Publicly Owned Treatment Works, Final Rule, 40 CFR Part 63, 26 October 1999.

2. U.S. Environmental Protection Agency, "Wastewater Flow Projections for POTWs and Privately and Federally Owned Treatment Works in 2000, 2005, and 2010," Table A-8 in *Biosolids Generation, Use, and Disposal in the United States*, EPA530-R-99-009, September 1999.

3. U.S. Environmental Protection Agency, Clean Watersheds Needs Survey, Ask WATERS Online Database Query Tool, at http://iaspub.epa.gov/waters10/query_tool.criteria?srept_no=165&branding=15, accessed 19 May 2009.

4. Stephen M. Roe, Melissa D. Spivey, Holly C. Lindquist, Kirstin B. Thesing, and Randy P. Strait, E.H. Pechan & Associates, Inc., *Estimating Ammonia Emissions from Anthropogenic Nonagricultural Sources – Draft Final Report*, prepared for U.S. Environmental Protection Agency, Emission Inventory Improvement Program, April 2004.

5. Prakasam Tata, Jay Witherspoon, Cecil Lue-Hing (eds.), VOC Emissions from Wastewater Treatment Plants: Characterization, Control, and Compliance, Lewis Publishers, 2003, p. 261.

6. Memorandum from Bob Lucas, U.S Environmental Protection Agency to Greg Nizich, U.S. Environmental Protection Agency, "Review of Baseline Emissions Inventory," 16 October 1998.

7. U.S. Environmental Protection Agency, "Facilities Database (Needs Survey) - Frequently Asked Questions," at http://www.epa.gov/owm/mtb/cwns/1996rtc/faqwfd.htm, accessed 22 May 2009.

8. U.S. Census Bureau, "Population Estimates," at http://www.census.gov/popest/estimates.html, released 14 May 2009 with population estimates as of 1 July 2008. Note: The U.S. Census Bureau estimate does not include the U.S. Virgin Islands, so the Census Bureau estimate was supplemented with Virgin Island population data from U.S. Department of Commerce, National Oceanic and Atmospheric Administration, *Demographic Baseline Report of U.S. Territories and Counties Adjacent to Coral Reef Habitats*, June 2008, at http://coris.noaa.gov/activities/coral_demographics, accessed 9 June 2009.

Table 1. Criteria and HAP Emission Factors for Publicly Owned Treatment Works (SCC 2630020000): Not Adjusted for Point Source Emissions

Pollutant Description	NIF 3.0 Pollutant Codes	Emission Factor (lb/MMGAL)	Emission Factor Reference(s)
1,1,2,2-TETRACHLOROETHANE	79345	1.75E-06	6, 7
1,1,2-TRICHLOROETHANE	79005	1.17E-06	6, 7
1,2,4-TRICHLOROBENZENE	120821	8.67E-05	6, 7
1,3-BUTADIENE	106990	2.51E-05	6, 7
1,4-DICHLOROBENZENE	106467	2.16E-04	6, 7
1-CHLORO-2,3-EPOXYPROPANE	106898	4.52E-06	6, 7
2,4-DINITROTOLUENE	121142	4.81E-05	6, 7
2-NITROPROPANE	79469	2.92E-07	6, 7
ACETALDEHYDE	75070	3.10E-04	6, 7
ACETONITRILE	75058	3.45E-04	6, 7
ACROLEIN	107028	3.84E-04	6, 7
ACRYLONITRILE	107131	3.86E-04	6, 7

Pollutant Description	NIF 3.0 Pollutant Codes	Emission Factor (lb/MMGAL)	Emission Factor Reference(s)
ALLYL CHLORIDE	107051	1.94E-05	6, 7
AMMONIA	NH3	1.69E-01	4
BENZENE	71432	6.73E-03	6, 7
BENZYL CHLORIDE	100447	8.17E-06	6, 7
BIPHENYL	92524	7.52E-05	6, 7
CARBON DISULFIDE	75150	4.32E-03	6, 7
CARBON TETRACHLORIDE	56235	1.12E-03	6, 7
CHLOROBENZENE	108907	4.83E-04	6, 7
CHLOROFORM	67663	6.44E-03	6, 7
CHLOROPRENE	126998	2.38E-05	6, 7
CRESOLS (INCLUDES O, M, & P)/CRESYLIC ACIDS	331	1.61E-06	6, 7
DIMETHYL SULFATE	77781	1.31E-06	6, 7
ETHYL ACRYLATE	140885	1.75E-06	6, 7
ETHYL BENZENE	100414	7.66E-03	6, 7
ETHYLENE OXIDE	75218	2.22E-04	6, 7
FORMALDEHYDE	50000	1.97E-05	6, 7
GLYCOL ETHERS	171	1.15E-02	6, 7
HEXACHLOROBUTADIENE	87683	7.29E-07	6, 7
HEXACHLOROCYCLOPENTADIENE	77474	5.83E-07	6, 7
METHANOL	67561	1.14E-02	6, 7
METHYL CHLOROFORM	71556	5.63E-04	6, 7
METHYL ETHYL KETONE	78933	2.84E-03	6, 7
METHYL ISOBUTYL KETONE	108101	2.69E-03	6, 7
METHYL METHACRYLATE	80626	3.11E-04	6, 7
METHYL TERT-BUTYL ETHER	1634044	6.37E-05	6, 7
METHYLENE CHLORIDE	75092	9.10E-03	6, 7
N,N-DIMETHYLANILINE	121697	3.22E-04	6, 7
NAPHTHALENE	91203	1.31E-03	6, 7
NITROBENZENE	98953	6.56E-06	6, 7
O-TOLUIDINE	95534	1.75E-06	6, 7
P-DIOXANE	123911	1.79E-05	6, 7
PROPIONALDEHYDE	123386	3.50E-06	6, 7
PROPYLENE DICHLORIDE	78875	1.15E-05	6, 7
PROPYLENE OXIDE	75569	7.32E-04	6, 7
STYRENE	100425	2.73E-03	6, 7
TETRACHLOROETHYLENE	127184	4.27E-03	6, 7
TOLUENE	108883	1.23E-02	6, 7
TRICHLOROETHYLENE	79016	3.06E-04	6, 7

Pollutant Description	NIF 3.0 Pollutant Codes	Emission Factor (lb/MMGAL)	Emission Factor Reference(s)
VINYL ACETATE	108054	7.66E-05	6, 7
VINYL CHLORIDE	75014	6.71E-06	6, 7
VINYLIDENE CHLORIDE	75354	4.23E-04	6, 7
VOLATILE ORGANIC COMPOUNDS	VOC	8.50E-01	5
XYLENES (MIXTURE OF O, M, AND P ISOMERS)	1330207	5.98E-02	6, 7

3.2.3.22 Solvent Utilization

a. Source Category Description

Solvent Utilization describes a wide range of activities where the primary pollutants released are volatile organic compounds (VOCs). Some examples would be surface coating operations (where a paint or finish is applied to a manufactured product), or consumer and commercial cleaning product application. The list of SCCs is included in Table 1.

b. Activity Data

The three types of activity data collected are population, road miles (used for traffic markings), and employment data. Table 1 shows the type of activity data used for each category and provides the SCC. Employment data is listed by the North American Industrial Classification Standard (NAICS) code(s) that were used to determine county-level employment for the category.

Population data was collected from the U.S. Census Bureau's population estimates for July 1, 2008.

For traffic paints, the Federal Highway Administration provides county-level road miles as a part of their HPMS data. The most recent data set available at the time of compilation was 2006.

Employment data was allocated to each county using *County Business Patterns* (CBP) employment data for 2006 (the most recent data available at the time of compilation). One of the limitations of *County Business Patterns* is the fact that data can be withheld if certain conditions are present so that confidential business data is not revealed. Divita 2009 describes how this limitation is overcome by applying a procedure to estimate the number of employees in a withheld county. For SCCs with multiple NAICS associated with them, this allocation procedure is performed for each individual NAICS.

Point source subtraction is completed by determining the number of employees per county in each of the associated NAICS codes and subtracting them from the CBP county total prior to calculating emissions. Table 2 lists the solvent categories and their point source subtraction results. In some cases, the entire county area source emission estimate becomes zero because all of the CBP employees are accounted for in the point source category.

c. Control Factors

For several categories, air pollution regulations exist that regulate the solvent content of products which can be sold. These solvent content limits have been taken into account where appropriate by modifying emission factors rather than developing control efficiency information.

d. Emission Factors

Emission factors were developed and reviewed by an ERTAC advisory panel composed of state and EPA personnel. Table 3 lists the SCC, pollutant, and emission factors that were developed for categories with the same factor throughout the country. As mentioned in the control factors section above, there were several categories where the emission factor was adjusted to account for rules that limit solvent content. Table 4 lists the categories with their uncontrolled and controlled emission factors while Table 5 lists the states for which controlled emission factors were applied.

e. Sample Calculations

Emissions are calculated for each county using emission factors and activity as:

$$E_{x,p} = A_x \times EF_{x,p}$$

where:

$E_{x,p}$ = annual emissions for category x and pollutant p
A_x = Population or employment data associated with category x
$EF_{x,p}$ = emission factor for category x and pollutant p

Example:

Using architectural coatings in Allegheny County, PA as an example:

According to the U.S. Census Bureau, population on July 1, 2008 is 1,215,103
The emission factor for VOC is 2.41 lb/person

E_{VOC} = 1,215,103 people × 2.41 lb VOC/ person

= 2,928,398 lb VOC or 1,464.2 ton VOC

f. References

Divita, 2009: Divita, Frank, E.H. Pechan & Associates, Inc., memorandum to Roy Huntley, U.S. Environmental Protection Agency, "County Business Patterns Allocations," June 30, 2009.

DOC, 2008: U.S. Department of Commerce, Bureau of the Census, 2006 *County Business Patterns*, Washington, DC. Address: http://www.census.gov/epcd/cbp/download/06_data/index.html accessed November 2008.

Table 1. Activity Data Sources Used for Each SCC

Category Name	SCC	NAICS	Comments
Architectural Coatings	2401001000	N/A	Population based Category
Automobile Refinishing	2401005000	81112	
		4411	
		4412	
Traffic Paints	2401008000	N/A	Road Miles coming from 2006 HPMS Data
Wood and Composition Flat Stock	2401015000	321	
Wood Furniture and Fixtures	2401020000	337110	
		337121	
		337122	
		337127	50% to this and 50% to metal furniture
		337129	
		337211	
		337212	
		337215	50% to this and 50% to metal furniture
		339111	50% to this and 50% to metal furniture
Metal Furniture	2401025000	337124	
		337127	50% to this and 50% to wood furniture
		337214	
		337215	50% to this and 50% to wood furniture
		339111	50% to this and 50% to wood furniture
Paper, Film and Foil	2401030000	322221	
		322222	
		322223	
		322225	
		322226	
Metal Cans	2401040000	33243	
Metal Sheet, Strip and Coils	2401045000	332812	
		339911	
		339912	
		339914	
Misc. Finished Metals	2401050000		Consolidated with Miscellaneous Manufacturing
Machinery and Equipment	2401055000	3331	
		3332	
		3333	
		33341	
Appliances	2401060000	3352	
Electronic and Other Electrical Coatings	2401065000	331319	
		331422	
		331491	
		335921	
		335929	
		335311	
Motor Vehicles	2401070000	3361	
		3362	
		3363	
Aircraft	2401075000	3364	

Category Name	SCC	NAICS	Comments
Railroads	2401085000	3365	
Marine coatings	2401080000	3366	
		488390	
Misc. Manufacturing	2401090000	339	
		3369	
Industrial Maintenance Coatings	2401100000	N/A	Population based Category
Other Special Purpose Coatings	2401200000	N/A	Population based Category
Cleaning Products: Industrial and Institutional	2415000000	331	
		332	
		333	
		334	
		335	
		336	
		337	
		339	
		441	
		483	
		484	
		485	
		488	
		8111	
		8112	
Dry Cleaning	2420000000	81231	
		81232	
		81233	
Graphic Arts	2425000000	32311	Category Calculated using either population or employment
		322211	
		322212	
		322213	
		322214	
		322215	
		322221	
		322222	
		322223	
		322224	
		322225	
		322226	
		322231	
		322232	
		322233	
		322291	
		322299	
Personal Care Products (Cosmetics and Toiletries)	2460100000	N/A	Population based Category
Cleaning Products: Household	2460200000	N/A	Population based Category
Automotive Aftermarket (Transportation: Motor Vehicles)	2460400000	N/A	Population based Category
Coatings and Related Products	2460500000	N/A	Population based Category
Adhesives and Sealants	2460600000	N/A	Population based Category
FIFRA Regulated Products	2460800000	N/A	Population based Category

Category Name	SCC	NAICS	Comments
Misc. Products	2460900000	N/A	Population based Category

Table 2 - Nonpoint Solvent Categories and Point Source Subtraction

Category Name	SCC	Missouri Point Subtraction	
Architectural Coatings	2401001000	Population based, no point contribution	
Automobile Refinishing	2401005000	No point facilities in Missouri	
Appliances	2401060000	No point facilities in Missouri	
Traffic Paints	2401008000	Road mile based, no point contribution	
Industrial Maintenance Coatings	2401100000	Population based, no point subtraction	
Other Special Purpose Coatings	2401200000	Population based, no point subtraction	
Dry Cleaning	2420000000	No point facilities in Missouri	
Personal Care Products (Cosmetics and Toiletries)	2460100000	Population based, no point subtraction	
Cleaning Products: Household	2460200000	Population based, no point subtraction	
Automotive Aftermarket (Transportation: Motor Vehicles)	2460400000	Population based, no point subtraction	
Coatings and Related Products	2460500000	Population based, no point subtraction	
Adhesives and Sealants	2460600000	Population based, no point subtraction	
FIFRA Regulated Products	2460800000	Population based, no point subtraction	
Misc. Products	2460900000	Population based, no point subtraction	
Wood and Composition Flat Stock	2401015000	*County*	*Employees removed*
		53	32
		91	515
		105	200
		107	85
		186	210
		201	290
		203	20
		207	839
Wood Furniture and Fixtures	2401020000	*County*	*Employees removed*
		145	800
		187	40
		189	55
		215	105
Metal Furniture	2401025000	*County*	*Employees removed*

Category Name	SCC	Missouri Point Subtraction	
		189	55
Paper, Film and Foil	2401030000	*County*	*Employees removed*
		189	160
		510	250
Metal Cans	2401040000	*County:*	*Employees removed:*
		21	205
		77	120
		95	147
		99	174
		159	650
		189	54
Metal Sheet, Strip and Coils	2401045000	*County:*	*Number of Employees removed:*
		189	*10*
		510	*125*
Machinery and Equipment	2401055000	*County:*	*Number of Employees removed:*
		21	850
		23	825
		29	165
		53	375
		97	50
		99	175
		183	950
		201	60
Electronic and Other Electrical Coatings	2401065000	*County:*	*Number of Employees removed:*
		27	550
		159	229
Motor Vehicles	2401070000	*County:*	*Number of Employees removed:*
		19	152
		47	5950
		51	534
		71	728
		77	325
		79	125
		91	325
		95	875
		97	251
		117	125

Category Name	SCC	Missouri Point Subtraction	
		157	1200
		159	650
		175	100
		183	2600
		189	1635
		201	95
		225	115
		229	170
Aircraft	2401075000	*County:*	*Number of Employees removed:*
		145	160
		183	945
		189	14555
Railroads	2401085000	*County:*	*Number of Employees removed:*
		99	316
Marine coatings	2401080000	*County:*	*Number of Employees removed:*
		83	195
		105	971
		155	520
		167	188
Misc. Manufacturing	2401090000	*County*	*Number of Employees Subtracted*
		165	900
		510	630
Cleaning Products: Industrial and Institutional	2415000000	*County*	*Number of Employees Subtracted*
		7	27
		9	2331
		19	402
		21	1233
		23	2225
		27	550
		29	165
		47	5950
		51	534
		53	375
		61	142
		71	1684
		77	1199
		79	125

Category Name	SCC	Missouri Point Subtraction	
		83	195
		87	85
		91	325
		93	299
		95	3687
		97	1716
		99	1253
		101	1300
		105	1461
		109	35
		113	590
		117	125
		131	556
		143	1150
		145	1285
		147	1150
		151	400
		155	695
		157	1212
		159	1848
		165	1500
		167	188
		175	100
		183	5480
		187	798
		189	18679
		201	155
		205	178
		215	105
		219	309
		225	115
		229	170
		510	900
Graphic Arts	2425000000	*County:*	*Employees Removed:*
		21	130
		31	1599
		47	270

Category Name	SCC	Missouri Point Subtraction	
		51	725
		71	545
		73	450
		77	309
		83	163
		95	4590
		115	375
		165	101
		189	375
		219	48
		510	107

Table 3. National Emission Factors

SCC	Description	Pollutant Code	Factor Numeric Value	Factor Unit Numerator	Factor Unit Denominator	Calculation Material Code	Material Description
2401005000	SC: Automobile Refinishing	107211	0.1424	LB	EACH	992	Employee
2401005000	SC: Automobile Refinishing	171	0.84817	LB	EACH	992	Employee
2401005000	SC: Automobile Refinishing	78933	10.591	LB	EACH	992	Employee
2401005000	SC: Automobile Refinishing	108101	2.848	LB	EACH	992	Employee
2401005000	SC: Automobile Refinishing	108883	1.602	LB	EACH	992	Employee
2401005000	SC: Automobile Refinishing	1330207	1.78	LB	EACH	992	Employee
2401005000	SC: Automobile Refinishing	VOC	89	LB	EACH	992	Employee
2401008000	SC: Traffic Paint	71556	2.2155	LB	ROAD MILE	225	Paint
2401008000	SC: Traffic Paint	78933	1.3504	LB	ROAD MILE	225	Paint
2401008000	SC: Traffic Paint	108101	1.5403	LB	ROAD MILE	225	Paint
2401008000	SC: Traffic Paint	108883	0.18568	LB	ROAD MILE	225	Paint
2401008000	SC: Traffic Paint	VOC	22.1	LB	ROAD MILE	225	Paint
2401015000	SC: Wood and Composition Flat Stock	107211	0.1935	LB	EACH	992	Employee
2401015000	SC: Wood and Composition Flat Stock	171	0.59426	LB	EACH	992	Employee
2401015000	SC: Wood and Composition Flat Stock	78933	1.548	LB	EACH	992	Employee
2401015000	SC: Wood and Composition Flat Stock	108101	3.569	LB	EACH	992	Employee
2401015000	SC: Wood and Composition Flat Stock	71556	0.344	LB	EACH	992	Employee
2401015000	SC: Wood and Composition Flat Stock	108883	1.118	LB	EACH	992	Employee
2401015000	SC: Wood and Composition Flat Stock	1330207	0.946	LB	EACH	992	Employee
2401015000	SC: Wood and Composition Flat Stock	VOC	43	LB	EACH	992	Employee
2401020000	SC: Wood Furniture and Fixtures	VOC	244	LB	EACH	992	Employee
2401025000	SC: Metal Furniture	107211	3.474	LB	EACH	992	Employee
2401025000	SC: Metal Furniture	171	10.66904	LB	EACH	992	Employee
2401025000	SC: Metal Furniture	78933	27.792	LB	EACH	992	Employee
2401025000	SC: Metal Furniture	108101	64.076	LB	EACH	992	Employee
2401025000	SC: Metal Furniture	71556	6.176	LB	EACH	992	Employee
2401025000	SC: Metal Furniture	108883	20.072	LB	EACH	992	Employee
2401025000	SC: Metal Furniture	1330207	16.984	LB	EACH	992	Employee
2401025000	SC: Metal Furniture	VOC	772	LB	EACH	992	Employee
2401030000	SC: Paper, Film and Foil	107211	3.3075	LB	EACH	992	Employee
2401030000	SC: Paper, Film and Foil	171	10.1577	LB	EACH	992	Employee
2401030000	SC: Paper, Film and Foil	78933	26.46	LB	EACH	992	Employee
2401030000	SC: Paper, Film and Foil	108101	61.005	LB	EACH	992	Employee
2401030000	SC: Paper, Film and Foil	71556	5.88	LB	EACH	992	Employee
2401030000	SC: Paper, Film and Foil	108883	19.11	LB	EACH	992	Employee
2401030000	SC: Paper, Film and Foil	1330207	16.17	LB	EACH	992	Employee

SCC	Description	Pollutant Code	Factor Numeric Value	Factor Unit Numerator	Factor Unit Denominator	Calculation Material Code	Material Description
2401030000	SC: Paper, Film and Foil	VOC	735	LB	EACH	992	Employee
2401040000	SC: Metal Cans	107211	10.467	LB	EACH	992	Employee
2401040000	SC: Metal Cans	171	32.14532	LB	EACH	992	Employee
2401040000	SC: Metal Cans	78933	83.736	LB	EACH	992	Employee
2401040000	SC: Metal Cans	108101	193.058	LB	EACH	992	Employee
2401040000	SC: Metal Cans	71556	18.608	LB	EACH	992	Employee
2401040000	SC: Metal Cans	108883	60.476	LB	EACH	992	Employee
2401040000	SC: Metal Cans	1330207	51.172	LB	EACH	992	Employee
2401040000	SC: Metal Cans	VOC	2,326	LB	EACH	992	Employee
2401045000	SC: Metal Sheet, Strip and Coils	VOC	2,877	LB	EACH	992	Employee
2401055000	SC: Machinery and Equipment	107211	0.4905	LB	EACH	992	Employee
2401055000	SC: Machinery and Equipment	171	1.50638	LB	EACH	992	Employee
2401055000	SC: Machinery and Equipment	78933	3.924	LB	EACH	992	Employee
2401055000	SC: Machinery and Equipment	108101	9.047	LB	EACH	992	Employee
2401055000	SC: Machinery and Equipment	71556	0.872	LB	EACH	992	Employee
2401055000	SC: Machinery and Equipment	108883	2.834	LB	EACH	992	Employee
2401055000	SC: Machinery and Equipment	1330207	2.398	LB	EACH	992	Employee
2401055000	SC: Machinery and Equipment	VOC	109	LB	EACH	992	Employee
2401060000	SC: Appliances	107211	1.1205	LB	EACH	992	Employee
2401060000	SC: Appliances	171	3.44118	LB	EACH	992	Employee
2401060000	SC: Appliances	78933	8.964	LB	EACH	992	Employee
2401060000	SC: Appliances	108101	20.667	LB	EACH	992	Employee
2401060000	SC: Appliances	71556	1.992	LB	EACH	992	Employee
2401060000	SC: Appliances	108883	6.474	LB	EACH	992	Employee
2401060000	SC: Appliances	1330207	5.478	LB	EACH	992	Employee
2401060000	SC: Appliances	VOC	249	LB	EACH	992	Employee
2401065000	SC: Electronic and Other Electrical Coatings	107211	0.11115	LB	EACH	992	Employee
2401065000	SC: Electronic and Other Electrical Coatings	171	0.341354	LB	EACH	992	Employee
2401065000	SC: Electronic and Other Electrical Coatings	78933	0.8892	LB	EACH	992	Employee
2401065000	SC: Electronic and Other Electrical Coatings	108101	2.0501	LB	EACH	992	Employee
2401065000	SC: Electronic and Other Electrical Coatings	71556	0.1976	LB	EACH	992	Employee
2401065000	SC: Electronic and Other Electrical Coatings	108883	0.6422	LB	EACH	992	Employee
2401065000	SC: Electronic and Other Electrical Coatings	1330207	0.5434	LB	EACH	992	Employee
2401065000	SC: Electronic and Other Electrical Coatings	VOC	24.7	LB	EACH	992	Employee
2401070000	SC: Motor Vehicles (including motor vehicle parts)	107211	0.738	LB	EACH	992	Employee

SCC	Description	Pollutant Code	Factor Numeric Value	Factor Unit Numerator	Factor Unit Denominator	Calculation Material Code	Material Description
2401070000	SC: Motor Vehicles (including motor vehicle parts)	171	2.26648	LB	EACH	992	Employee
2401070000	SC: Motor Vehicles (including motor vehicle parts)	78933	5.904	LB	EACH	992	Employee
2401070000	SC: Motor Vehicles (including motor vehicle parts)	108101	13.612	LB	EACH	992	Employee
2401070000	SC: Motor Vehicles (including motor vehicle parts)	71556	1.312	LB	EACH	992	Employee
2401070000	SC: Motor Vehicles (including motor vehicle parts)	108883	4.264	LB	EACH	992	Employee
2401070000	SC: Motor Vehicles (including motor vehicle parts)	1330207	3.608	LB	EACH	992	Employee
2401070000	SC: Motor Vehicles (including motor vehicle parts)	VOC	164	LB	EACH	992	Employee
2401075000	SC: Aircraft	107211	0.0675	LB	EACH	992	Employee
2401075000	SC: Aircraft	171	0.2073	LB	EACH	992	Employee
2401075000	SC: Aircraft	78933	0.54	LB	EACH	992	Employee
2401075000	SC: Aircraft	108101	1.245	LB	EACH	992	Employee
2401075000	SC: Aircraft	71556	0.12	LB	EACH	992	Employee
2401075000	SC: Aircraft	108883	0.39	LB	EACH	992	Employee
2401075000	SC: Aircraft	1330207	0.33	LB	EACH	992	Employee
2401075000	SC: Aircraft	VOC	15	LB	EACH	992	Employee
2401080000	SC: Marine	107211	0.891	LB	EACH	992	Employee
2401080000	SC: Marine	171	2.73636	LB	EACH	992	Employee
2401080000	SC: Marine	78933	7.128	LB	EACH	992	Employee
2401080000	SC: Marine	108101	16.434	LB	EACH	992	Employee
2401080000	SC: Marine	71556	1.584	LB	EACH	992	Employee
2401080000	SC: Marine	108883	5.148	LB	EACH	992	Employee
2401080000	SC: Marine	1330207	4.356	LB	EACH	992	Employee
2401080000	SC: Marine	VOC	198	LB	EACH	992	Employee
2401085000	SC: Railroads	107211	0.999	LB	EACH	992	Employee
2401085000	SC: Railroads	171	3.06804	LB	EACH	992	Employee
2401085000	SC: Railroads	78933	7.992	LB	EACH	992	Employee
2401085000	SC: Railroads	108101	18.426	LB	EACH	992	Employee
2401085000	SC: Railroads	71556	1.776	LB	EACH	992	Employee
2401085000	SC: Railroads	108883	5.772	LB	EACH	992	Employee
2401085000	SC: Railroads	1330207	4.884	LB	EACH	992	Employee
2401085000	SC: Railroads	VOC	222	LB	EACH	992	Employee
2401090000	SC: Misc. Manufacturing	107211	0.612	LB	EACH	992	Employee
2401090000	SC: Misc. Manufacturing	171	1.87952	LB	EACH	992	Employee
2401090000	SC: Misc. Manufacturing	78933	4.896	LB	EACH	992	Employee
2401090000	SC: Misc. Manufacturing	108101	11.288	LB	EACH	992	Employee
2401090000	SC: Misc. Manufacturing	71556	1.088	LB	EACH	992	Employee
2401090000	SC: Misc. Manufacturing	108883	3.536	LB	EACH	992	Employee
2401090000	SC: Misc. Manufacturing	1330207	2.992	LB	EACH	992	Employee
2401090000	SC: Misc. Manufacturing	VOC	136	LB	EACH	992	Employee
2401200000	SC: Other Special Purpose Coatings	107211	0.0000315	LB	EACH	762	Person

SCC	Description	Pollutant Code	Factor Numeric Value	Factor Unit Numerator	Factor Unit Denominator	Calculation Material Code	Material Description
2401200000	SC: Other Special Purpose Coatings	171	0.0000967	LB	EACH	762	Person
2401200000	SC: Other Special Purpose Coatings	78933	0.000252	LB	EACH	762	Person
2401200000	SC: Other Special Purpose Coatings	108101	0.000581	LB	EACH	762	Person
2401200000	SC: Other Special Purpose Coatings	71556	0.000056	LB	EACH	762	Person
2401200000	SC: Other Special Purpose Coatings	108883	0.000182	LB	EACH	762	Person
2401200000	SC: Other Special Purpose Coatings	1330207	0.000154	LB	EACH	762	Person
2401200000	SC: Other Special Purpose Coatings	VOC	0.007	LB	EACH	762	Person
2415000000	Cleaning Products: Industrial and Institutional	79016	0.2092418	LB	EACH	992	Employee
2415000000	Cleaning Products: Industrial and Institutional	VOC	30.5	LB	EACH	992	Employee
2420000000	Dry Cleaning	VOC	467	LB	EACH	992	Employee
2425000000	Graphic Arts	107211	0.0163326	LB	EACH	762	Person
2425000000	Graphic Arts	67561	0.1633260	LB	EACH	762	Person
2425000000	Graphic Arts	78933	0.0391982	LB	EACH	762	Person
2425000000	Graphic Arts	108101	0.0097996	LB	EACH	762	Person
2425000000	Graphic Arts	108883	0.1665924	LB	EACH	762	Person
2425000000	Graphic Arts	1330207	0.0424647	LB	EACH	762	Person
2425000000	Graphic Arts	VOC	4.4	LB	EACH	762	Person
2425000000	Graphic Arts	107211	5.5011136	LB	EACH	992	Employee
2425000000	Graphic Arts	67561	55.011136	LB	EACH	992	Employee
2425000000	Graphic Arts	78933	13.202673	LB	EACH	992	Employee
2425000000	Graphic Arts	108101	3.3006682	LB	EACH	992	Employee
2425000000	Graphic Arts	108883	56.111359	LB	EACH	992	Employee
2425000000	Graphic Arts	1330207	14.302895	LB	EACH	992	Employee
2425000000	Graphic Arts	VOC	1,482	LB	EACH	992	Employee
2460100000	Personal Care Products (Cosmetics and Toiletries)	67561	0.255436	LB	EACH	762	Person
2460100000	Personal Care Products (Cosmetics and Toiletries)	108883	0.005092	LB	EACH	762	Person
2460100000	Personal Care Products (Cosmetics and Toiletries)	VOC	1.9	LB	EACH	762	Person
2460200000	Cleaning Products: Household	67561	0.241992	LB	EACH	762	Person
2460200000	Cleaning Products: Household	108883	0.004824	LB	EACH	762	Person
2460200000	Cleaning Products: Household	VOC	1.8	LB	EACH	762	Person
2460400000	Automotive Aftermarket (Transportation: Motor Vehicles)	67561	0.1828384	LB	EACH	762	Person
2460400000	Automotive Aftermarket (Transportation: Motor Vehicles)	108883	0.0036448	LB	EACH	762	Person
2460400000	Automotive Aftermarket (Transportation: Motor Vehicles)	VOC	1.36	LB	EACH	762	Person
2460500000	Coatings and Related Products	67561	0.127718	LB	EACH	762	Person
2460500000	Coatings and Related Products	108883	0.002546	LB	EACH	762	Person

SCC	Description	Pollutant Code	Factor Numeric Value	Factor Unit Numerator	Factor Unit Denominator	Calculation Material Code	Material Description
2460500000	Coatings and Related Products	VOC	0.95	LB	EACH	762	Person
2460600000	Adhesives and Sealants	67561	0.0766308	LB	EACH	762	Person
2460600000	Adhesives and Sealants	108883	0.0015276	LB	EACH	762	Person
2460600000	Adhesives and Sealants	VOC	0.57	LB	EACH	762	Person
2460800000	FIFRA Regulated Products	67561	0.2393032	LB	EACH	762	Person
2460800000	FIFRA Regulated Products	108883	0.0047704	LB	EACH	762	Person
2460800000	FIFRA Regulated Products	VOC	1.78	LB	EACH	762	Person
2460900000	Miscellaneous Products	67561	0.0094108	LB	EACH	762	Person
2460900000	Miscellaneous Products	108883	0.0001876	LB	EACH	762	Person
2460900000	Miscellaneous Products	VOC	0.07	LB	EACH	762	Person

Table 4. Emission Factors Which Vary Based on Presence of Controls

SCC	Pollutant Code	Factor Numeric Value Uncontrolled	Factor Numeric Value Controlled	Factor Unit Numerator	Factor Unit Denominator	Calculation Material Code	Material Description
2401001000	123911	6.18E-05	4.82E-05	LB	EACH	762	Person
2401001000	584849	6.18E-05	4.82E-05	LB	EACH	762	Person
2401001000	101688	0.000433	0.000337	LB	EACH	762	Person
2401001000	75070	0.000309	0.000241	LB	EACH	762	Person
2401001000	117817	9.27E-05	7.23E-05	LB	EACH	762	Person
2401001000	98828	0.001174	0.000916	LB	EACH	762	Person
2401001000	84742	6.18E-05	4.82E-05	LB	EACH	762	Person
2401001000	131113	3.09E-05	2.41E-05	LB	EACH	762	Person
2401001000	100414	0.007663	0.005977	LB	EACH	762	Person
2401001000	107211	0.156014	0.121681	LB	EACH	762	Person
2401001000	50000	6.18E-05	4.82E-05	LB	EACH	762	Person
2401001000	171	0.063809	0.049767	LB	EACH	762	Person
2401001000	110543	0.000464	0.000362	LB	EACH	762	Person
2401001000	67561	0.031147	0.024293	LB	EACH	762	Person
2401001000	80626	0.000371	0.000289	LB	EACH	762	Person
2401001000	71556	0.02883	0.022485	LB	EACH	762	Person
2401001000	108101	0.009301	0.007254	LB	EACH	762	Person
2401001000	78933	0.041684	0.032511	LB	EACH	762	Person
2401001000	75092	0.018447	0.014388	LB	EACH	762	Person
2401001000	91203	0.001421	0.001109	LB	EACH	762	Person
2401001000	100425	0.003152	0.002458	LB	EACH	762	Person
2401001000	127184	0.000185	0.000145	LB	EACH	762	Person
2401001000	108883	0.072059	0.056201	LB	EACH	762	Person
2401001000	121448	0.000185	0.000145	LB	EACH	762	Person
2401001000	108054	0.000371	0.000289	LB	EACH	762	Person
2401001000	1330207	0.088096	0.068709	LB	EACH	762	Person
2401001000	VOC	3.09	2.41	LB	EACH	762	Person
2401100000	107211	0.00495	0.000675	LB	EACH	762	Person
2401100000	171	0.015202	0.002073	LB	EACH	762	Person
2401100000	71556	0.0088	0.0012	LB	EACH	762	Person
2401100000	108101	0.0913	0.01245	LB	EACH	762	Person
2401100000	78933	0.0396	0.0054	LB	EACH	762	Person
2401100000	108883	0.0286	0.0039	LB	EACH	762	Person
2401100000	1330207	0.0242	0.0033	LB	EACH	762	Person

SCC	Pollutant Code	Factor Numeric Value Uncontrolled	Factor Numeric Value Controlled	Factor Unit Numerator	Factor Unit Denominator	Calculation Material Code	Material Description
2401100000	VOC	1.1	0.15	LB	EACH	762	Person

Table 5. States to Which Controlled Emission Factors are Applied

State FIPS	Abbreviation
04	AZ
06	CA
09	CT
10	DE
11	DC
23	ME
24	MD
25	MA
33	NH
34	NJ
36	NY
42	PA
44	RI
48	TX
50	VT
51	VA

3.2.3.23 Gasoline Distribution Stage I

a. Source Category Description

Stage I gasoline distribution includes the following gasoline emission points: 1) bulk terminals; 2) pipeline facilities; 3) bulk plants; 4) tank trucks; and 5) service stations. Emissions from Stage I gasoline distribution occur as gasoline vapors are released into the atmosphere. These Stage I processes are subject to EPA's maximum available control technology (MACT) standards for gasoline distribution.[1]

Emissions from gasoline distribution at bulk terminals and bulk plants take place when gasoline is loaded into a storage tank or tank truck, from working losses (for fixed roof tanks), and from working losses and roof seals (for floating roof tanks). Working losses consist of both breathing and emptying losses. Breathing losses are the expulsion of vapor from a tank vapor space that has expanded or contracted because of daily changes in temperature and barometric pressure; these emissions occur in the absence of any liquid level change in the tank. Emptying losses occur when the air that is drawn into the tank during liquid removal saturates with hydrocarbon vapor and expands, thus exceeding the fixed capacity of the vapor space and overflowing through the pressure vacuum valve.[2]

Emissions from tank trucks in transit occur when gasoline vapor evaporates from (1) loaded tank trucks during transportation of gasoline from bulk terminals/plants to service stations, and (2) empty tank trucks returning from service stations to bulk terminals/plants.[3] Pipeline emissions result from the valves and pumps found at pipeline pumping stations and from the valves, pumps, and storage tanks at pipeline breakout stations. Stage I gasoline distribution emissions also occur when gasoline vapors are displaced from storage tanks during unloading of gasoline from tank trucks at service stations (Gasoline Service Station Unloading) and from gasoline vapors evaporating from service station storage tanks and from the lines going to the pumps (Underground Storage Tank Breathing and Emptying).

The following SCCs are included in Stage I Gasoline Distribution:

SCC	SCC Level 1	SCC Level 2	SCC Level 3	SCC Level 4
2501050120	Storage and Transport	Petroleum and Petroleum Product Storage	Bulk Terminals: All Evaporative Losses	Gasoline
2501055120	Storage and Transport	Petroleum and Petroleum Product Storage	Bulk Plants: All Evaporative Losses	Gasoline
2501060051	Storage and Transport	Petroleum and Petroleum Product Storage	Gasoline Service Stations	Stage 1: Submerged Filling
2501060052	Storage and Transport	Petroleum and Petroleum Product Storage	Gasoline Service Stations	Stage 1: Splash Filling

SCC	SCC Level 1	SCC Level 2	SCC Level 3	SCC Level 4
2501060053	Storage and Transport	Petroleum and Petroleum Product Storage	Gasoline Service Stations	Stage 1: Balanced Submerged Filling
2501060201	Storage and Transport	Petroleum and Petroleum Product Storage	Gasoline Service Stations	Underground Tank: Breathing and Emptying
2505030120	Storage and Transport	Petroleum and Petroleum Product Transport	Truck	Gasoline
2505040120	Storage and Transport	Petroleum and Petroleum Product Transport	Pipeline	Gasoline

b. Bulk Terminals and Pipelines

There are no generally accepted activity-based VOC emission factors for the pipelines and bulk terminals sectors because they are generally treated as point sources whose emissions are estimated using site-specific information. For example, emission estimates for bulk terminal storage tanks are typically derived from tank specific parameters that are input into the TANKS program.[4] Therefore, for bulk terminals and pipelines, EPA estimated 2008 national VOC emissions by multiplying 1998 national estimates developed in support of the Gasoline Distribution MACT standard[5] by the 2008 to 1998 ratio of the national volume of wholesale gasoline supplied (see Table 1). The gasoline supply information was obtained from Table 2 in Volume I of Petroleum Supply Annual 2008.[6]

Table 1. Estimation of National 2008 VOC Emissions for Pipelines and Bulk Terminals

Category	1998 Post-MACT Control Emissions (Mg)	Mg to Ton Conversion Factor	1998 Emissions (tons)	Ratio of 2008 to 1998 Gasoline Supplied	2008 Emissions (tons)
Pipelines	79,830	1.1023	87,997	(8,989 thousand barrels per day / 8,253 thousand barrels per day) = 1.089	95,844
Bulk Terminals	137,555	1.1023	151,627		165,149

To estimate HAP emissions, EPA applied national average speciation profiles to the VOC emission estimates.[7] Table 2 presents these speciation profiles and the national bulk terminal and pipeline HAP emission estimates (note that unless otherwise noted, all emission values reported in this section exclude estimates for Puerto Rico and the U.S. Virgin Islands). EPA used total VOC emission estimates, so emissions represent total emissions. Where necessary, States should perform point source subtractions to obtain nonpoint emissions. The following describes how total national VOC estimates were allocated to counties.

Table 2. HAP Speciation Profiles and 2008 Bulk Terminal and Pipeline Emissions

HAP	Pollutant	Percentage of		2008 National Emissions (tons)

				Bulk Terminals	Pipelines
Benzene	71432	0.27	7	4.46E+02	2.59E+02
2,2,4-Trimethylpentane	540841	0.75	7	1.24E+03	7.19E+02
Cumene	98828	0.012	7	1.98E+01	1.15E+01
Ethyl Benzene	100414	0.053	7	8.75E+01	5.08E+01
n-Hexane	110543	1.8	7	2.97E+03	1.73E+03
Naphthalene	91203	0.00027	7	4.46E-01	2.59E-01
Toluene	108883	1.4	7	2.31E+03	1.34E+03
Xylenes	1330207	0.56	7	9.25E+02	5.37E+02

For both categories, EPA allocated national VOC and HAP emissions for these categories in a two-step manner. First, EPA allocated emissions based on 2008 gasoline supply data reported by the U.S. Department of Energy (DOE). Next, EPA allocated emissions based on employment data reported in the 2007 County Business Patterns.[8]

For pipelines, EPA allocated emissions to Petroleum Administration for Defense (PAD) Districts based on the total amount of finished motor gasoline moved by pipeline in each PAD in year 2008. There are five PAD Districts across the United States. PAD District 1 comprises seventeen states plus the District of Columbia along the Atlantic Coast; PAD District 2 comprises fifteen states in the Midwest; PAD District 3 comprises six states in South Central U.S.; PAD District 4 comprises five states in the Rocky Mountains; and PAD District 5 comprises seven states along the West Coast. These data, which are displayed below in Table 3, are reported in Table 35 of Volume 1 of Petroleum Supply Annual 2008.[9] Next, EPA allocated pipeline emissions in each PAD District to counties based on County Business Patterns employment data. Because employment data for NAICS code 48691 (Pipeline Transportation of Refined Petroleum Products) are often withheld due to confidentiality reasons, EPA used the number of employees in NAICS code 42471 (Petroleum Bulk Stations and Terminals) for this allocation. To better account for the location of refined petroleum pipelines, however, EPA did not allocate any activity to States which had employees in this NAICS code, but did not have employees in NAICS code 48691 (i.e., District of Columbia, Idaho, Maine, New Hampshire, Vermont, and West Virginia).

Table 3. Movement of Finished Motor Gasoline by Pipeline Between PAD Districts, 2008

	From I	From II	From III	From IV	From V
To I	n/a	393	333,462	0	0
To II	70,895	n/a	99,167	7,442	0
To III	0	9,193	n/a	0	0
To IV	0	8,680	5,778	n/a	0
To V	0	0	25,453	9,287	n/a

For bulk terminals, EPA first allocated national emissions to States based on the 2008 refinery, bulk terminal, and natural gas plant stocks of motor gasoline reported for each State in Table 33

of Volume 1 of DOE's Petroleum Supply Annual 2008 (see Table 4).[9] Next, EPA allocated emissions in each State to counties based on the number of NAICS code 42471 (Petroleum Bulk Stations and Terminals) employees reported in the 2007 County Business Patterns.[8]

Table 4. Refinery, Bulk Terminal, and Natural Gas Plant Stocks of Motor Gasoline, 2008

State	Motor Gasoline (Thousand Barrels)	State	Motor Gasoline (Thousand Barrels)
Alabama	1,090	Montana	872
Alaska	616	Nebraska	658
Arizona	470	Nevada	102
Arkansas	819	New Hampshire	0
California	460	New Jersey	2,956
Colorado	748	New Mexico	350
Connecticut	0	New York	1,469
Delaware	105	North Carolina	1,724
District of Columbia	0	North Dakota	291
Florida	1,877	Ohio	2,724
Georgia	1,724	Oklahoma	1,245
Hawaii	12	Oregon	525
Idaho	181	Pennsylvania	3,595
Illinois	1,940	Rhode Island	0
Indiana	2,464	South Carolina	720
Iowa	1,090	South Dakota	283
Kansas	2,347	Tennessee	923
Kentucky	1,045	Texas	9,530
Louisiana	5,209	Utah	793
Maine	374	Vermont	31
Maryland	31	Virginia	1,285
Massachusetts	0	Washington	1,902
Michigan	1,772	West Virginia	183
Minnesota	1,305	Wisconsin	704
Mississippi	1,580	Wyoming	910
Missouri	491		

It is important to reiterate that the above discussion addresses the calculation of total VOC emissions. The 2008 point source NEI reports VOC emissions related to bulk terminal and pipeline processes. To obtain nonpoint emissions, States should subtract the 2008 point source VOC emission estimates from the total VOC emission estimates reported here. The relevant point source SCCs are listed in Tables 5 and 6 below.

Table 5. Pipeline Point Source SCCs

SCC	SCC Level 1	SCC Level 2	SCC Level 3	SCC Level 4
40600501	Petroleum and Solvent Evaporation	Transportation and Marketing of Petroleum Products	Pipeline Petroleum Transport - General - All Products	Pipeline Leaks

SCC	SCC Level 1	SCC Level 2	SCC Level 3	SCC Level 4
40600502	Petroleum and Solvent Evaporation	Transportation and Marketing of Petroleum Products	Pipeline Petroleum Transport - General - All Products	Pipeline Venting
40600503	Petroleum and Solvent Evaporation	Transportation and Marketing of Petroleum Products	Pipeline Petroleum Transport - General - All Products	Pump Station
40600504	Petroleum and Solvent Evaporation	Transportation and Marketing of Petroleum Products	Pipeline Petroleum Transport - General - All Products	Pump Station Leaks

Table 6. Bulk Terminal Point Source SCCs

SCC	SCC Level 1	SCC Level 2	SCC Level 3	SCC Level 4
40400101	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Gasoline RVP 13: Breathing Loss (67000 Bbl Capacity) - Fixed Roof Tank
40400102	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Gasoline RVP 10: Breathing Loss (67000 Bbl Capacity) - Fixed Roof Tank
40400103	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Gasoline RVP 7: Breathing Loss (67000 Bbl. Capacity) - Fixed Roof Tank
40400104	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Gasoline RVP 13: Breathing Loss (250000 Bbl Capacity)-Fixed Roof Tank
40400105	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Gasoline RVP 10: Breathing Loss (250000 Bbl Capacity)-Fixed Roof Tank
40400106	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Gasoline RVP 7: Breathing Loss (250000 Bbl Capacity) - Fixed Roof Tank
40400107	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Gasoline RVP 13: Working Loss (Diam. Independent) - Fixed Roof Tank

SCC	SCC Level 1	SCC Level 2	SCC Level 3	SCC Level 4
40400108	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Gasoline RVP 10: Working Loss (Diameter Independent) - Fixed Roof Tank
40400109	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Gasoline RVP 7: Working Loss (Diameter Independent) - Fixed Roof Tank
40400110	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Gasoline RVP 13: Standing Loss (67000 Bbl Capacity)-Floating Roof Tank
40400111	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Gasoline RVP 10: Standing Loss (67000 Bbl Capacity)-Floating Roof Tank
40400112	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Gasoline RVP 7: Standing Loss (67000 Bbl Capacity)- Floating Roof Tank
40400113	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Gasoline RVP 13: Standing Loss (250000 Bbl Cap.) - Floating Roof Tank
40400114	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Gasoline RVP 10: Standing Loss (250000 Bbl Cap.) - Floating Roof Tank
40400115	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Gasoline RVP 7: Standing Loss (250000 Bbl Cap.) - Floating Roof Tank
40400116	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Gasoline RVP 13/10/7: Withdrawal Loss (67000 Bbl Cap.) - Float Rf Tnk
40400117	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Gasoline RVP 13/10/7: Withdrawal Loss (250000 Bbl Cap.) - Float Rf Tnk
40400118	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Gasoline RVP 13: Filling Loss (10500 Bbl Cap.) - Variable Vapor Space

SCC	SCC Level 1	SCC Level 2	SCC Level 3	SCC Level 4
40400119	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Gasoline RVP 10: Filling Loss (10500 Bbl Cap.) - Variable Vapor Space
40400120	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Gasoline RVP 7: Filling Loss (10500 Bbl Cap.) - Variable Vapor Space
40400131	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Gasoline RVP 13: Standing Loss - Ext. Floating Roof w/ Primary Seal
40400132	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Gasoline RVP 10: Standing Loss - Ext. Floating Roof w/ Primary Seal
40400133	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Gasoline RVP 7: Standing Loss - External Floating Roof w/ Primary Seal
40400141	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Gasoline RVP 13: Standing Loss - Ext. Floating Roof w/ Secondary Seal
40400142	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Gasoline RVP 10: Standing Loss - Ext. Floating Roof w/ Secondary Seal
40400143	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Gasoline RVP 7: Standing Loss - Ext. Floating Roof w/ Secondary Seal
40400148	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Gasoline RVP 13/10/7: Withdrawal Loss - Ext. Float Roof (Pri/Sec Seal)
40400150	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Miscellaneous Losses/Leaks: Loading Racks
40400151	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Valves, Flanges, and Pumps
40400152	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Vapor Collection Losses
40400153	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Vapor Control Unit Losses

SCC	SCC Level 1	SCC Level 2	SCC Level 3	SCC Level 4
40400161	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Gasoline RVP 13: Standing Loss - Int. Floating Roof w/ Primary Seal
40400162	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Gasoline RVP 10: Standing Loss - Int. Floating Roof w/ Primary Seal
40400163	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Gasoline RVP 7: Standing Loss - Internal Floating Roof w/ Primary Seal
40400171	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Gasoline RVP 13: Standing Loss - Int. Floating Roof w/ Secondary Seal
40400172	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Gasoline RVP 10: Standing Loss - Int. Floating Roof w/ Secondary Seal
40400173	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Gasoline RVP 7: Standing Loss - Int. Floating Roof w/ Secondary Seal
40400178	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Gasoline RVP 13/10/7: Withdrawal Loss - Int. Float Roof (Pri/Sec Seal)

c. Bulk Plants

EPA calculated VOC emissions from bulk plants by developing an average emission factor from the bulk plant motor gasoline VOC emissions and throughput data developed in support of the Gasoline Distribution MACT standards.[2,5] To estimate 2008 national VOC emissions, the VOC emission factor (8.62 pounds of VOC per 1,000 gallons) was applied to the estimated national volume of gasoline passing through bulk plants in 2008. The volume of bulk plant gasoline throughput was assumed to be 9 percent of total gasoline consumption.[10] Total gasoline consumption for 2008 was assumed to be the same as the volume of finished motor gasoline supplied as reported on the U.S. Energy Information Administration's Petroleum Navigator website.[11] The resulting national VOC emission estimate was then allocated to counties based on employment data for NAICS code 42471 (Petroleum Bulk Stations and Terminals). To estimate benzene emissions from bulk plants, EPA multiplied VOC emission estimates by county-level speciation profiles calculated from the annual onroad refueling (Stage 2) emissions from the 2008 NEI NMIM results.[12] All other HAPs were estimated by multiplying VOC emissions by the national average speciation profiles displayed in Table 7.

Table 7. Bulk Plant HAP Speciation Profiles and Total Emission Estimates

Pollutant	Pollutant Code	Emission Factor	Reference	National Emissions (tpy)
VOC	VOC	8.62 lb./1,000 gallons	2 and 5	5.35E+04
2,2,4-Trimethylpentane	540841	0.75% of VOC	7	4.01E+02
Cumene	98828	0.012% of VOC	7	6.41E+00
Ethyl Benzene	100414	0.053% of VOC	7	2.83E+01
n-Hexane	110543	1.8% of VOC	7	9.62E+02
Naphthalene	91203	0.00027% of VOC	7	1.44E-01
Toluene	108883	1.4% of VOC	7	7.48E+02
Xylenes	1330207	0.56% of VOC	7	2.99E+02
Benzene	71432	county-specific % of VOC	12	3.94E+02

It is important to reiterate that the above discussion addresses the calculation of total VOC emissions. The 2008 point source NEI reports VOC emissions related to bulk plants. To obtain nonpoint emissions, States should subtract the 2008 point source VOC emission estimates from the total VOC emission estimates reported here. The relevant point source SCCs are listed in Table 8 below.

Table 8. Bulk Plant Point Source SCCs

SCC	SCC Level 1	SCC Level 2	SCC Level 3	SCC Level 4
40400201	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Plants	Gasoline RVP 13: Breathing Loss (67000 Bbl Capacity) - Fixed Roof Tank
40400202	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Plants	Gasoline RVP 10: Breathing Loss (67000 Bbl Capacity) - Fixed Roof Tank
40400203	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Plants	Gasoline RVP 7: Breathing Loss (67000 Bbl. Capacity) - Fixed Roof Tank
40400204	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Plants	Gasoline RVP 13: Working Loss (67000 Bbl. Capacity) - Fixed Roof Tank
40400205	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Plants	Gasoline RVP 10: Working Loss (67000 Bbl. Capacity) - Fixed Roof Tank

SCC	SCC Level 1	SCC Level 2	SCC Level 3	SCC Level 4
40400206	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Plants	Gasoline RVP 7: Working Loss (67000 Bbl. Capacity) - Fixed Roof Tank
40400207	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Plants	Gasoline RVP 13: Standing Loss (67000 Bbl Cap.) - Floating Roof Tank
40400208	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Plants	Gasoline RVP 10: Standing Loss (67000 Bbl Cap.) - Floating Roof Tank
40400209	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Plants	Gasoline RVP 7: Standing Loss (67000 Bbl Cap.) - Floating Roof Tank
40400210	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Plants	Gasoline RVP 13/10/7: Withdrawal Loss (67000 Bbl Cap.) - Float Rf Tnk
40400211	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Plants	Gasoline RVP 13: Filling Loss (10500 Bbl Cap.) - Variable Vapor Space
40400212	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Plants	Gasoline RVP 10: Filling Loss (10500 Bbl Cap.) - Variable Vapor Space
40400213	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Plants	Gasoline RVP 7: Filling Loss (10500 Bbl Cap.) - Variable Vapor Space
40400231	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Plants	Gasoline RVP 13: Standing Loss - Ext. Floating Roof w/ Primary Seal
40400232	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Plants	Gasoline RVP 10: Standing Loss - Ext. Floating Roof w/ Primary Seal
40400233	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Plants	Gasoline RVP 7: Standing Loss - External Floating Roof w/ Primary Seal
40400241	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Plants	Gasoline RVP 13: Standing Loss - Ext. Floating Roof w/ Secondary Seal

SCC	SCC Level 1	SCC Level 2	SCC Level 3	SCC Level 4
40400242	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Plants	Gasoline RVP 10: Standing Loss - Ext. Floating Roof w/ Secondary Seal
40400243	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Plants	Gasoline RVP 7: Standing Loss - Ext. Floating Roof w/ Secondary Seal
40400248	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Plants	Gasoline RVP 10/13/7: Withdrawal Loss - Ext. Float Roof (Pri/Sec Seal)
40400250	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Plants	Loading Racks
40400251	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Plants	Valves, Flanges, and Pumps
40400252	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Plants	Miscellaneous Losses/Leaks: Vapor Collection Losses
40400253	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Plants	Miscellaneous Losses/Leaks: Vapor Control Unit Losses
40400261	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Plants	Gasoline RVP 13: Standing Loss - Int. Floating Roof w/ Primary Seal
40400262	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Plants	Gasoline RVP 10: Standing Loss - Int. Floating Roof w/ Primary Seal
40400263	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Plants	Gasoline RVP 7: Standing Loss - Internal Floating Roof w/ Primary Seal
40400271	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Plants	Gasoline RVP 13: Standing Loss - Int. Floating Roof w/ Secondary Seal
40400272	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Plants	Gasoline RVP 10: Standing Loss - Int. Floating Roof w/ Secondary Seal
40400273	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Plants	Gasoline RVP 7: Standing Loss - Int. Floating Roof w/ Secondary Seal

SCC	SCC Level 1	SCC Level 2	SCC Level 3	SCC Level 4
40400278	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Plants	Gasoline RVP 10/13/7: Withdrawal Loss - Int. Float Roof (Pri/Sec Seal)
40400401	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Petroleum Products - Underground Tanks	Gasoline RVP 13: Breathing Loss
40400402	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Petroleum Products - Underground Tanks	Gasoline RVP 13: Working Loss
40400403	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Petroleum Products - Underground Tanks	Gasoline RVP 10: Breathing Loss
40400404	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Petroleum Products - Underground Tanks	Gasoline RVP 10: Working Loss
40400405	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Petroleum Products - Underground Tanks	Gasoline RVP 7: Breathing Loss
40400406	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Petroleum Products - Underground Tanks	Gasoline RVP 7: Working Loss
40600101	Petroleum and Solvent Evaporation	Transportation and Marketing of Petroleum Products	Tank Cars and Trucks	Gasoline: Splash Loading **
40600126	Petroleum and Solvent Evaporation	Transportation and Marketing of Petroleum Products	Tank Cars and Trucks	Gasoline: Submerged Loading **
40600131	Petroleum and Solvent Evaporation	Transportation and Marketing of Petroleum Products	Tank Cars and Trucks	Gasoline: Submerged Loading (Normal Service)
40600136	Petroleum and Solvent Evaporation	Transportation and Marketing of Petroleum Products	Tank Cars and Trucks	Gasoline: Splash Loading (Normal Service)
40600141	Petroleum and Solvent Evaporation	Transportation and Marketing of Petroleum Products	Tank Cars and Trucks	Gasoline: Submerged Loading (Balanced Service)
40600144	Petroleum and Solvent Evaporation	Transportation and Marketing of Petroleum Products	Tank Cars and Trucks	Gasoline: Splash Loading (Balanced Service)
40600147	Petroleum and Solvent Evaporation	Transportation and Marketing of Petroleum Products	Tank Cars and Trucks	Gasoline: Submerged Loading (Clean Tanks)

d. Tank Trucks in Transit

The EPA calculated VOC emissions from Tank Trucks in Transit by multiplying county-level tank truck gasoline throughput by a 0.06 lb of VOC per 1,000 gallon emission factor. As noted in Table 9, this emission factor is the sum of the individual emission factors reported in the Gasoline Distribution EIIP guidance document for gasoline-filled trucks (traveling to service

station/bulk plant for delivery) and vapor-filled trucks (traveling to bulk terminal/plant for reloading).[3] County-level gasoline consumption was estimated by summing county-level onroad and nonroad estimates. County-level onroad consumption was estimated by subtracting the NMIM-derived national nonroad consumption from the EIA's estimate of finished motor gasoline supplied and then allocating to counties using NMIM-derived onroad county-level CO_2 emissions.[11,13] County-level nonroad consumption was estimated by allocating NMIM-derived state/SCC-level nonroad gasoline consumption to the county-level based on nonroad county/SCC-level CO_2 emissions.[13] Gasoline throughput for tank trucks was computed by multiplying the county-level gasoline consumption estimates by a factor of 1.09 to account for gasoline that is transported more than once in a given area (i.e., transported from bulk terminal to bulk plant and then from bulk plant to service station).[10] Benzene emission estimates were calculated by multiplying county-level NMIM speciation profiles by the VOC emission estimates.[12] Emissions for the remaining HAPs were calculated by multiplying VOC emissions by the national speciation profiles presented in Table 10.

Table 9. Tank Trucks in Transit VOC Emission Factors

VOC Emission Factor	
Vapor-Filled Trucks	0.055 lb/1,000 gallons
Gasoline Filled Trucks	0.005 lb/1,000 gallons
Total	**0.06 lb/1,000 gallons**

Table 10. Tank Trucks in Transit HAP Speciation Profiles and Total Emission Estimates

Pollutant	Pollutant Code	Emission Factor	Reference	National Emissions (tpy)
VOC	VOC	0.06 lb./1,000 gallons	3	4.51E+03
2,2,4-Trimethylpentane	540841	0.75% of VOC	7	3.38E+01
Cumene	98828	0.012% of VOC	7	5.41E-01
Ethyl Benzene	100414	0.053% of VOC	7	2.39E+00
n-Hexane	110543	1.8% of VOC	7	8.11E+01
Naphthalene	91203	0.00027% of VOC	7	1.22E-02
Toluene	108883	1.4% of VOC	7	6.31E+01
Xylenes	1330207	0.56% of VOC	7	2.52E+01
Benzene	71432	county-specific % of VOC	12	3.13E+01

It is important to reiterate that the above discussion addresses the calculation of <u>total</u> VOC emissions. The 2008 point source NEI reports VOC emissions related to tank trucks in transit. To obtain nonpoint emissions, States should subtract the 2008 point source VOC emission estimates from the total VOC emission estimates reported here. The relevant point source SCCs are listed in Table 11 below.

Table 11. Tank Trucks in Transit Point Source SCCs

SCC	SCC Level 1	SCC Level 2	SCC Level 3	SCC Level 4
40400154	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Terminals	Tank Truck Vapor Leaks
40400254	Petroleum and Solvent Evaporation	Petroleum Liquids Storage (non-Refinery)	Bulk Plants	Tank Truck Vapor Losses
40600162	Petroleum and Solvent Evaporation	Transportation and Marketing of Petroleum Products	Tank Cars and Trucks	Gasoline: Loaded with Fuel (Transit Losses)
40600163	Petroleum and Solvent Evaporation	Transportation and Marketing of Petroleum Products	Tank Cars and Trucks	Gasoline: Return with Vapor (Transit Losses)

e. Underground Storage Tank (UST) Breathing and Emptying

The EPA calculated VOC emissions from UST breathing and emptying by multiplying county-level total gasoline consumption, calculated as described above in the Tank Trucks in Transit section, by the 1 lb/1,000 gallons emission factor recommended by the Gasoline Distribution EIIP guidance document.[3] With the exception of benzene, HAP emissions were estimated by multiplying VOC emissions by the national HAP speciation profiles listed in Table 12. To estimate benzene emissions, EPA multiplied VOC emissions by county-level speciation profiles from NMIM.[12]

Table 12. Underground Storage Tank (UST) Breathing and Emptying Emissions

Pollutant	Pollutant Code	Emission Factor	Reference	National Emissions (tpy)
VOC	VOC	1 lb./1,000 gallons	3	6.89E+04
2,2,4-Trimethylpentane	540841	0.75% of VOC	7	5.17E+02
Cumene	98828	0.012% of VOC	7	8.27E+00
Ethyl Benzene	100414	0.053% of VOC	7	3.65E+01
n-Hexane	110543	1.8% of VOC	7	1.24E+03
Naphthalene	91203	0.00027% of VOC	7	1.86E-01
Toluene	108883	1.4% of VOC	7	9.65E+02
Xylenes	1330207	0.56% of VOC	7	3.86E+02
Benzene	71432	county-specific % of VOC	12	4.78E+02

It is important to reiterate that the above discussion addresses the calculation of total VOC emissions. The 2008 point source NEI reports VOC emissions related to UST breathing and emptying. To obtain nonpoint emissions, States should subtract the 2008 point source VOC emission estimates from the total VOC emission estimates reported here. The relevant point source SCCs are listed in Table 13 below.

Table 13. UST Breathing and Emptying Point Source SCCs

SCC	SCC Level 1	SCC Level 2	SCC Level 3	SCC Level 4
40600307	Petroleum and Solvent Evaporation	Transportation and Marketing of Petroleum Products	Gasoline Retail Operations - Stage I	Underground Tank Breathing and Emptying
40600707	Petroleum and Solvent Evaporation	Transportation and Marketing of Petroleum Products	Consumer (Corporate) Fleet Refueling - Stage I	Underground Tank Breathing and Emptying

f. Gasoline Service Station Unloading

The EPA estimated uncontrolled VOC emissions from unloading of gasoline into service station tanks from county-level total gasoline consumption estimates, calculated as described above in the Tank Trucks in Transit section, and the following AP-42 equation:

$$L = (12.46 \times S \times P \times M)/T$$

where:

L = uncontrolled loading loss of liquid loaded (in lb/1,000 gallons)
S = saturation factor;
P = true vapor pressure of liquid loaded (pounds per square inch absolute);
M = molecular weight of vapors (lbs per lb/mole); and
T = temperature of liquid loaded (Rankine).[14]

This equation requires geographic-specific information. This information includes the saturation factor, which differs by method of loading (e.g., submerged filling), Reid vapor pressure (RVP), temperature, and true vapor pressure of gasoline.

Gasoline RVP values were obtained from the NMIM 2008 database. Because NMIM is a county-level database that reports RVP values by month, EPA developed county-level monthly gasoline consumption estimates by multiplying annual county gasoline consumption by monthly allocation factors. State-level monthly allocation factors were developed from monthly gasoline sales data reported in the Federal Highway Administration's Highway Statistics 2008.[15] Geographic-specific information on the temperature of gasoline and the method of loading were obtained from a Stage I and II gasoline emission inventory study prepared for the EIIP.[16]

The true vapor pressure of gasoline was estimated for each county/month using the following equation:

where:

P = Stock true vapor pressure, in pounds per square inch absolute.
T = Stock temperature, in degrees Fahrenheit.
RVP = Reid vapor pressure, in pounds per square inch.
S = Slope of the ASTM distillation curve at 10 percent evaporated, in degrees Fahrenheit per percent (assumed that S = 3.0 for gasoline per Figure 7.1-14a of AP-42).[17]

This equation was used to calculate monthly county-level true vapor pressure estimates. In cases where more than one filling method was assumed to apply in a county (e.g., due to vapor balancing requirement applying to a portion of a county's total gasoline throughput due to a throughput exemption), EPA developed two sets of calculations for each month, one for each filling method.

The EIIP study regional stock temperature information was used to estimate the temperature of gasoline in each county in each month (see Table 14).[16]

Table 14. Temperature Data Used in Estimating True Vapor Pressure (ºF)

Region	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
1 (Northeast)	46	44	44	48	57	64	70	73	70	64	60	51
2 (Southeast)	66	67	69	74	78	81	80	81	80	77	69	60
3 (Southwest)	60	61	62	66	73	78	81	84	82	78	71	62
4 (Midwest)	33	35	40	47	55	62	71	73	68	65	64	63
5 (West)	50	52	62	66	73	76	80	83	86	84	73	60

6 (Northwest)	49	50	50	52	57	62	67	72	68	60	49	42

Region 1: Alaska, Connecticut, Delaware, DC, Illinois, Indiana, Kentucky, Maine, Maryland, Massachusetts, Michigan, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, Virginia, West Virginia, Wisconsin
Region 2: Alabama, Arkansas, Florida, Georgia, Hawaii, Louisiana, Mississippi, N. Carolina, S. Carolina, Tennessee
Region 3: Arizona, New Mexico, Oklahoma, Texas
Region 4: Colorado, Iowa, Kansas, Minnesota, Missouri, Montana, Nebraska, N. Dakota, S. Dakota, Wyoming
Region 5: California, Nevada, Utah
Region 6: Idaho, Oregon, Washington

The EPA incorporated the effect of Stage I Gasoline Service Station vapor balancing controls based on the county-level control efficiency values (either 90 or 95 percent) that were compiled for the EIIP study.[16] Table 15 presents the HAP speciation profiles and total VOC and HAP emission estimates calculated using these procedures.

Emissions are reported by SCC based on the filling methods used in each county as determined from the EIIP study: SCC 2501060051 (Submerged Filling); SCC 2501060052 (Splash Filling); and SCC 2501060053 (Balanced Submerged Filling).

Table 15. Stage I Service Station Unloading HAP Speciation Profiles and Total Emission Estimates

Pollutant	Pollutant Code	Emission Factor	Reference	National Emissions (tpy)
VOC	VOC	Equation 1	14	3.82E+05
2,2,4-Trimethylpentane	540841	0.75% of VOC	7	2.86E+03
Cumene	98828	0.012% of VOC	7	4.58E+01
Ethyl Benzene	100414	0.053% of VOC	7	2.02E+02
n-Hexane	110543	1.8% of VOC	7	6.87E+03
Naphthalene	91203	0.00027% of VOC	7	1.03E+00
Toluene	108883	1.4% of VOC	7	5.35E+03
Xylenes	1330207	0.56% of VOC	7	2.14E+03
Benzene	71432	county-specific % of VOC	12	2.97E+03

It is important to reiterate that the above discussion addresses the calculation of <u>total</u> VOC emissions. The 2008 point source NEI reports VOC emissions related to service station unloading. To obtain nonpoint emissions, States should subtract the 2008 point source VOC emission estimates from the total VOC emission estimates reported here. The relevant point source SCCs are listed in Tables 16, 17, and 18 below.

Table 16. Service Station Unloading: Submerged Fill Point Source SCCs

SCC	SCC Level 1	SCC Level 2	SCC Level 3	SCC Level 4
40600302	Petroleum and Solvent Evaporation	Transportation and Marketing of Petroleum Products	Gasoline Retail Operations - Stage I	Submerged Filling w/o Controls
40600702	Petroleum and Solvent Evaporation	Transportation and Marketing of Petroleum Products	Consumer (Corporate) Fleet Refueling - Stage I	Submerged Filling w/o Controls

Table 17. Service Station Unloading: Splash Fill Point Source SCCs

SCC	SCC Level 1	SCC Level 2	SCC Level 3	SCC Level 4
40600301	Petroleum and Solvent Evaporation	Transportation and Marketing of Petroleum Products	Gasoline Retail Operations - Stage I	Splash Filling
40600701	Petroleum and Solvent Evaporation	Transportation and Marketing of Petroleum Products	Consumer (Corporate) Fleet Refueling - Stage I	Splash Filling

Table 18. Service Station Unloading: Balanced Submerged Fill Point Source SCCs

SCC	SCC Level 1	SCC Level 2	SCC Level 3	SCC Level 4
40600305	Petroleum and Solvent Evaporation	Transportation and Marketing of Petroleum Products	Gasoline Retail Operations - Stage I	Unloading **
40600306	Petroleum and Solvent Evaporation	Transportation and Marketing of Petroleum Products	Gasoline Retail Operations - Stage I	Balanced Submerged Filling
40600706	Petroleum and Solvent Evaporation	Transportation and Marketing of Petroleum Products	Consumer (Corporate) Fleet Refueling - Stage I	Balanced Submerged Filling

Unloading emissions might also be reported in the point source inventory under SCC 40600399 (Gasoline Retail Operations – Stage I, Not Classified).

g. Example Emission Calculations

Bulk Terminals
2008 national benzene emissions = VOC emissions x HAP speciation factor
1.65E+05 tons x 0.0027
4.46E+02 tons

Pipelines
2008 national cumene emissions = VOC emissions x HAP speciation factor
9.58E+04 tons x 0.00012
1.15E+01 tons

Bulk Plants

2008 national VOC emissions

= national gasoline consumption x proportion passing through bulk plants x VOC emission factor
= 137,801,370 thousand gallons x 0.09 x 8.62 lbs. VOC/thousand gallons
= 1.07E+08 lbs. / 2000 lbs.
= 5.35E+04 tons

Tank Trucks in Transit

2008 Alamance County, North Carolina VOC emissions

= total county gasoline consumption x (1+proportion of gasoline transported twice) x VOC emission factor
= 61,446 thousand gallons x (1+0.09) x 0.06 lbs. VOC/thousand gallons
= 4.02E+03 lbs. / 2000 lbs.
= 2.01E+00 tons

UST Breathing and Emptying

2008 Alamance County, North Carolina VOC emissions

= total county gasoline consumption x VOC emission factor
= 61,466 thousand gallons x 1 lb. VOC/thousand gallons
= 6.15E+04 lbs. / 2000 lbs.
= 30.73E+00 tons

Stage I Gasoline Service Station Unloading - uncontrolled VOC emissions in July for balanced submerged fill unloading in Alamance County, NC

= annual county consumption x proportion of annual gasoline sold in July x VOC emission factor
= 61,466 thousand gallons x 0.1087 x VOC emission factor
= 6,681 thousand gallons x ((12.46 x saturation factor x true vapor pressure x vapor molecular weight) / temperature))
= 6,681 thousand gallons x ((12.46 x 1.0 x 6.309 x 67.811) / 540)
= 65,950 lbs

Incorporate effect of control (vapor balancing requirement)

= Uncontrolled emissions x ((100-CE)/100)
= 65,950 lbs x ((100-90)/100)
= 6,595 lbs / 2,000 lbs
= 3.30E+00 tons

h. References

1. U.S. Environmental Protection Agency, “National Emission Standards for Source Categories: Gasoline Distribution (Stage I), 40 CFR Part 63.” Office of Air Quality Planning and Standards, February 28, 1997. Pages 9087-9093.

2. U.S. Environmental Protection Agency, "Gasoline Distribution Industry (Stage I)-Background Information for Proposed Standards," EPA-453/R94-002a, Office of Air Quality Planning and Standards, January 1994.

3. Eastern Research Group, Inc., "Volume III: Chapter 11, Gasoline Marketing (Stage I and Stage II), Revised Final," prepared for the Emission Inventory Improvement Program, January 2001.

4. U.S. Environmental Protection Agency, “TANKS Emission Estimation Software,” Office of Air Quality Planning and Standards, Emission Inventory Group, available from http://www.epa.gov/ttn/chief/software/tanks/index.html, last updated October 29, 2004.

5. U.S. Environmental Protection Agency, "Gasoline Distribution Industry (Stage I)-Background Information for Promulgated Standards," EPA-453/R94-002b, Office of Air Quality Planning and Standards, November 1994.

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8. U.S. Department of Commerce, Bureau of the Census, County Business Patterns 2007, retrieved from http://www.census.gov/econ/cbp/index.html, released July 2009.

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Protection Agency, Office of Air Quality Planning and Standards, Emission Standards Division, July 6, 2004.

11. U.S. Department of Energy, Energy Information Administration, Petroleum Navigator – Product Supplied, available from http://tonto.eia.doe.gov/dnav/pet/pet_cons_psup_dc_nus_mbblpd_a.htm, accessed January 2010.

12. Benzene speciation profiles calculated by Jonathan Dorn, E.H. Pechan and Associates, Inc. from county-level VOC and benzene emissions developed from a 2008 NMIM run. The NMIM run was performed by John Van Bruggen, E.H. Pechan and Associates, Inc., January 2010.

13. 2008 NMIM runs performed by John Van Bruggen and Melissa Spivey, E.H. Pechan and Associates, Inc., January 2010.

14. U.S. Environmental Protection Agency, "Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources, Section 5.2 Transportation and Marketing of Petroleum Liquids," Office of Air Quality Planning and Standards, January 1995.

15. Federal Highway Administration, "Monthly Gasoline/Gasohol Reported by States," Table MF-33GA in *Highway Statistics 2008*, Office of Highway Policy Information, available from http://www.fhwa.dot.gov/policyinformation/statistics/2008/, accessed January 2010.

16. Pacific Environmental Services, Inc., "Draft Summary of the Analysis of the Emissions Reported in the 1999 NEI for Stage I and Stage II Operations at Gasoline Service Stations," prepared for the U.S. Environmental Protection Agency and the Emission Inventory Improvement Program, September 2002.

17. U.S. Environmental Protection Agency, "Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources, Chapter 7: Liquid Storage Tanks," Office of Air Quality Planning and Standards, Emission Inventory Group, September 1997.

3.2.3.24 Gasoline Distribution – Stage II

a. Source Category Description

Stage II gasoline distribution emissions are the refueling emissions that occur during the transfer of gasoline from storage tanks at service stations to vehicle fuel tanks.

Stage II emissions are reported under the following nonpoint SCC:

SCC	SCC Level 1	SCC Level 2	SCC Level 3	SCC Level 4
2501060100	Storage and Transport	Petroleum and Petroleum Product Storage	Gasoline Service Stations	Stage 2: Total

This SCC is only used in the NEI to report emissions for onroad gasoline vehicle refueling. (Estimates for Stage II nonroad equipment gasoline refueling are included in the nonroad source inventory.)

b. Emissions Calculations

The VOC emission estimates were generated via the 2008 NMIM model using county-specific fuel parameters, temperature, humidity, Reid vapor pressure, and other relevant inputs. The EPA calculated HAP emission estimates by applying the HAP speciation profiles reported in Table 1.

Table 1. Stage II Service Station Refueling HAP Speciation Profiles and Total Emission Estimates

Pollutant	Pollutant Code	Emission Factor	Reference	National Emissions (tpy)
VOC	VOC	n/a	1	1.60E+05
2,2,4-Trimethylpentane	540841	0.75% of VOC	2	1.21E+03
Cumene	98828	0.012% of VOC	2	1.94E+01
Ethyl Benzene	100414	0.053% of VOC	2	8.58E+01
n-Hexane	110543	1.8% of VOC	2	2.91E+03
Naphthalene	91203	0.00027% of VOC	2	4.37E-01
Toluene	108883	1.4% of VOC	2	2.27E+03
Xylenes	1330207	0.56% of VOC	2	9.07E+02
Benzene	71432	county-specific % of VOC	3	1.23E+03

It is important to note that the above discussion addresses the calculation of total onroad VOC emissions from refueling. The 2008 point source NEI reports VOC emissions related to service station refueling. To obtain nonpoint emissions, States should subtract the 2008 point source VOC emission estimates from the total VOC emission estimates reported here. The relevant point source SCCs are listed in Table 2 below.

Table 2. Gasoline Vehicle Refueling Point Source SCCs

SCC	SCC Level 1	SCC Level 2	SCC Level 3	SCC Level 4
40600401	Petroleum and Solvent Evaporation	Transportation and Marketing of Petroleum Products	Filling Vehicle Gas Tanks - Stage II	Vapor Loss w/o Controls
40600402	Petroleum and Solvent Evaporation	Transportation and Marketing of Petroleum Products	Filling Vehicle Gas Tanks - Stage II	Liquid Spill Loss w/o Controls
40600499	Petroleum and Solvent Evaporation	Transportation and Marketing of Petroleum Products	Filling Vehicle Gas Tanks - Stage II	Not Classified **
40600601	Petroleum and Solvent Evaporation	Transportation and Marketing of Petroleum Products	Consumer (Corporate) Fleet Refueling - Stage II	Vapor Loss w/o Controls
40600602	Petroleum and Solvent Evaporation	Transportation and Marketing of Petroleum Products	Consumer (Corporate) Fleet Refueling - Stage II	Liquid Spill Loss w/o Controls
40600603	Petroleum and Solvent Evaporation	Transportation and Marketing of Petroleum Products	Consumer (Corporate) Fleet Refueling - Stage II	Vapor Loss w/controls

c. References

1. 2008 NMIM runs performed by John Van Bruggen and Melissa Spivey, E.H. Pechan and Associates, Inc., January 2010.

2. Hester, Charles, MACTEC, Inc. Memorandum from Charles Hester, MACTEC, Inc., to Stephen Shedd, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Emission Standards Division, "Review of Data on HAP Content in Gasoline," May 18, 2006.

3. Benzene speciation profiles calculated by Jonathan Dorn, E.H. Pechan and Associates, Inc. from county-level VOC and benzene emissions developed from a 2008 NMIM run. The NMIM run was performed by John Van Bruggen, E.H. Pechan and Associates, Inc., January 2010.

3.2.3.25 Fuel Combustion – Industrial and Commercial/Institutional (ICI)

The Central States Regional Planning Association (CENRAP) contracted with Pechan to provide an updated methodology to calculate ICI fuel combustion emissions for 2002, and make the methodology updatable for future inventory projects. Appendix E-6 is documentation of the ICI methodology and describes how it is applied to a revised 2002 inventory.

Statewide emissions are calculated using the fuel activity and emission factors, then statewide point source emission contributions are subtracted, and finally the emissions are allocated to counties. The Energy Information Administration's (EIA's) State Energy Data System (SEDS) provides total energy consumption by sector, but the values have to be adjusted by energy not used for combustion and nonroad equipment use. EIA's *2002 Manufacturing Energy Consumption Survey* (MECS) was used to get regional sectoral energy consumption that is not used for combustion. A run of the NONROAD model for 2006 provided the diesel and LPG quantity to subtract for commercial sector nonroad equipment. Emission factors from Roy Huntley of the EPA, the Emission Inventory improvement Plan (EIIP), and AP-42 cover the various fuel types for criteria pollutants. Emissions from coal combustion require the use of Missouri-specific coal sulfur content from the Energy Information Administration Quarterly Coal Report. Statewide point source emission contributions are subtracted by compiling the sector's CO emissions by Source Classification Code (SCC), which is fuel specific, back-calculating using AP-42 emission factors to a fuel throughput, and subtracting that fuel throughput from the statewide total. Before allocating the remaining nonpoint emissions to Missouri counties, an energy-intensity adjustment is done to account for the variation of energy used per employee for each industrial manufacturing NAICS code. *County Business Patterns* (CBP) published annually by the US Census Bureau outlines employment by NAICS codes and the energy-intensity per employee by NAICS code derived from EIA's 2002 Annual Energy Outlook. Emissions are then allocated to individual counties based on commercial/institutional employment by county and based on energy intensity and employment for the industrial sector.

Appendix E-6 outlines the activity data used, emission factors, and the calculation template spreadsheets for the categories below.

SCC	SCC Description
2102001000	Stationary Source Fuel Combustion; Industrial; Anthracite Coal; Total: All Boiler Types
2102002000	Stationary Source Fuel Combustion; Industrial; Bituminous/Subbituminous Coal; Total: All Boiler Types
2102004000	Stationary Source Fuel Combustion; Industrial; Distillate Oil; Total: Boilers and IC Engines
2102005000	Stationary Source Fuel Combustion; Industrial; Residual Oil; Total: All Boiler Types

SCC	SCC Description
2102006000	Stationary Source Fuel Combustion; Industrial; Natural Gas; Total: Boilers and IC Engines
2102007000	Stationary Source Fuel Combustion; Industrial; Liquid Petroleum Gas; Total: All Boiler Types
2102008000	Stationary Source Fuel Combustion; Industrial; Wood; Total: All Boiler Types
2102011000	Stationary Source Fuel Combustion; Industrial; Kerosene; Total: All Boiler Types
2103001000	Stationary Source Fuel Combustion; Commercial/Institutional; Anthracite Coal; Total: All Boiler Types
2103002000	Stationary Source Fuel Combustion; Commercial/Institutional; Bituminous/Subbituminous Coal; Total: All Boiler Types
2103004000	Stationary Source Fuel Combustion; Commercial/Institutional; Distillate Oil; Total: Boilers and IC Engines
2103005000	Stationary Source Fuel Combustion; Commercial/Institutional; Residual Oil; Total: All Boiler Types
2103006000	Stationary Source Fuel Combustion; Commercial/Institutional; Natural Gas; Total: Boilers and IC Engines
2103007000	Stationary Source Fuel Combustion; Commercial/Institutional; Liquid Petroleum Gas; Total: All Combustor Types
2103008000	Stationary Source Fuel Combustion; Commercial/Institutional; Wood; Total: All Boiler Types
2103011000	Stationary Source Fuel Combustion; Commercial/Institutional; Kerosene; Total: All Combustor Types

3.2.3.26 Fossil Fuel Combustion – Residential – Liquified Petroleum Gas (LPG)

a. Source Category Description

Residential LPG Combustion is liquefied propane gas that is burned in residential housing. Common uses of energy associated with this sector include space heating, water heating, and cooking.

The general approach to calculating emissions for this SCC is to take State LPG Consumption from the EIA and allocate it to the county level using methods described below. County level LPG consumption is multiplied by the emission factors to calculate emissions.

For this source category, the following SCC was assigned:

SCC	Descriptor 1	Descriptor 3	Descriptor 6	Descriptor 8
2104007000	Stationary Source Fuel Combustion	Residential	Liquefied Petroleum Gas (LPG)	Total: All Combustion Types

b. Activity Data

Residential liquefied petroleum gas (LPG) combustion emissions were calculated using the volume of LPG consumed in the United States. State-level LPG consumption by sector is available from the Energy Information Administration (EIA).[1] Year 2006 consumption data were used as a surrogate for 2008 emissions because these were the latest data available when this inventory was prepared.

State-level LPG consumption was allocated to each county using the US Census Bureau's 2000 Census Detailed Housing Information.[2] These data include the number of housing units using a specific type of fuel for residential heating. State LPG consumption was allocated to each county using the ratio of the number of houses burning LPG in each county to the total number of houses burning LPG in the State.

c. Control Factors

No control measures are assumed for this category.

d. Emission Factors

Pollutant emission factors for residential LPG are based on the residential natural gas emission factors.[3,4,5] For all counties in the United States, the natural gas consumed by residential combustion is assumed to have a heating value of 1,020 Btu per cubic foot and a sulfur content of 2,000 grains per million cubic feet.[3] Those natural gas emission factors originally presented in the units "pounds per million cubic feet" were converted to energy-based units using the 1,020 Btu/cubic foot conversion factor. Once all the natural gas emission factors were converted to energy-based units, the natural gas emission

factors were converted to LPG emission factors by multiplying by 96,750 Btu/gallon. Some emission factors were revised based on recommendations by an ERTAC advisory panel composed of state and EPA personnel.

e. Sample Calculations

Emissions are calculated for each county using emission factors and activity as:

$$E_{x,p} = FC_x \times EF_{x,p}$$

where:

$E_{x,p}$ = annual emissions for fuel type x and pollutant p,
FC_x = annual fuel consumption for fuel type x,
$EF_{x,p}$ = emission factor for fuel type x and pollutant p,

And $FC_x = A_{State} \times (H_{county} / H_{State})$

where :

A_{State} = State activity data from EIA
H_{County} = number of houses in the county using LPG as the primary heating fuel
H_{State} = number of houses in the state using LPG as the primary heating fuel.

Example:
Using Allegheny County, PA as an example:

The State of Pennsylvania had a reported use of 4,743 thousand barrels of LPG in the residential sector in 2006. Allegheny County, PA had 4,317 houses out of the state total of 145,254 that use LPG as the primary heating fuel. This equates to a share of 2.97% of the LPG used for residential heating in the state. From Table 1, CO emission factor is 159.6 lb/thousand barrels.

E_{CO} = 4,743 thousand barrels × (4,317 houses / 145,254 houses)
× 159.6 lb/thousand barrels

= 22,498 lb CO or 11.25 tons CO

f. References

1. U.S. Department of Energy, Energy Information Administration (EIA). State Energy Data 2006 Consumption. Washington, DC 2008. Internet address: http://www.eia.doe.gov/emeu/states/sep_use/total/csv/use_all_phy.csv, accessed November 2008.

2. U.S. Census Bureau. "Table H40. House Heating Fuel Type", Census 2000: Summary File 3. Internet address:

http://factfinder.census.gov/servlet/DatasetMainPageServlet?_program=DEC&_submenuId=&_lang=en&_ts=, accessed July 2009.

3. U.S. Environmental Protection Agency. Compilation of Air Pollutant Emission Factors, 5th Edition, AP-42, Volume I: Stationary Point and Area Sources. Research Triangle Park, North Carolina. 1996.

4. U.S. Environmental Protection Agency, Emission Factors and Inventory Group. "Documentation for the 1999 Base Year Nonpoint Area Source National Emission Inventory for Hazardous Air Pollutants." Prepared by Eastern Research Group, Inc. Morrisville, NC. September 2002.

5. U.S. Environmental Protection Agency. Emission Factor and Inventory Group. Final Summary of the Development and Results of a Methodology for Calculating Area Source Emissions from Residential Fuel Combustion. Prepared by Pacific Environmental Services, Inc. Research Triangle Park, NC. September 2002. Internet address: http://www.epa.gov/ttn/chief/eiip/techreport/volume03/draft1999_residfuel_inven_apr2003.zip accessed, November 2004.

Table 1. National Criteria Pollutant and HAP Emission Factors for Residential LPG Combustion

Pollutant Code	Pollutant Code Description	Factor Numeric Value	Factor Unit Numerator	Factor Unit Denominator
129000	Pyrene	2.09151E-05	LB	E3BBL
206440	Fluoranthene	1.2549E-05	LB	E3BBL
50000	Formaldehyde	0.313726103	LB	E3BBL
71432	Benzene	0.008784331	LB	E3BBL
75070	Acetaldehyde	5.43792E-05	LB	E3BBL
85018	Phenanthrene	7.11113E-05	LB	E3BBL
86737	Fluorene	1.17124E-05	LB	E3BBL
91203	Naphthalene	0.002551639	LB	E3BBL
CO	CO	159.6	LB	E3BBL
NH3	Ammonia	1.95	LB	E3BBL
NOX	NOX	562.8	LB	E3BBL
PM10-FIL	PM10-FIL	0.796764706	LB	E3BBL
PM25-FIL	PM25-FIL	0.438220588	LB	E3BBL
PM-CON	PM-CON	1.274823529	LB	E3BBL
SO2	SO2	2.390294118	LB	E3BBL
VOC	VOC	21.91102941	LB	E3BBL

3.2.3.27 Fuel Combustion – Residential- Wood

EPA created the Residential Wood Combustion tool to assist states with compiling the 2005 NEI, and has updated the tool with new SCCs to reflect new equipment (certified/ non-certified inserts, outdoor hydronic heaters, wood pellet stoves), revised equipment population based on regional surveys and American Housing Survey (US Census) data, and wood use ratios.

The tool is a Microsoft Access database with data input tables for appliance types and population, fuel inputs, burn temporal profiles, and emission factors. Missouri had no state-specific updates to input files, so the EPA defaults for Missouri were used to calculate emissions. A specific query is ran that performs the calculation and outputs the emission table for the state or counties of interest.

3.2.4 Nonpoint Source Emission Summary

Table 10 STLNA Nonpoint Emissions (tons per year)

County Name	CO	NH_3	NO_X	PM_{10}-Pri	$PM_{2.5}$-Pri	SO_2	VOC
Franklin County	2,025.42	1,299.59	295.22	17,974.75	2,109.54	992.76	1,534.94
Jefferson County	4,391.33	167.60	402.74	29,264.18	3,493.58	910.13	3,158.50
St. Charles County	2,694.02	887.07	463.77	14,262.61	1,734.42	899.09	5,686.72
St. Louis County	8,527.42	1,048.21	2,228.20	32,095.22	4,137.64	5,458.17	20,252.98
St. Louis City	3,146.33	133.45	1,036.38	8,747.03	1,220.31	3,277.89	7,682.83
Totals	**20,784.53**	**3,535.93**	**4,426.31**	**102,343.80**	**12,695.50**	**11,538.04**	**38,315.97**

3.3 Mobile Source Emissions

3.3.1 Nonroad Mobile Sources

Nonroad categories include recreational marine and land-based vehicles, farm and construction machinery, industrial, commercial, logging, and lawn and garden equipment, and railway maintenance equipment. These equipment are powered by compression-ignition engines which are typically diesel-fueled, as well as spark-ignition (gasoline-fueled) engines. Compressed natural gas (CNG) and liquefied petroleum gas (LPG) engines may also power certain types of nonroad equipment.

3.3.1.1 Procedures and Methodologies

For nonroad gasoline, diesel, LPG and CNG sources, EPA's National Mobile Inventory Model (NMIM), incorporating the NONROAD2008 model, was used to calculate nonroad emissions. At the request of the Department, EPA Region 7 calculated off-road mobile emissions for the Missouri counties in the St. Louis $PM_{2.5}$ nonattainment area. Using the fuel and meteorological data from the NCD, EPA ran the non-road model and created annual emissions for 2008 and 2022. The modeling protocol submitted by EPA Region 7 to the Department, for the development of the 2008 and 2022 off-road mobile emissions can be found in Appendix E-4 of this document. The data generated by EPA for the 2008 off-road mobile source emissions for the Missouri counties in the St. Louis PM2.5 nonattainment area are summarized in Table 11.

For aircraft, EPA ran the Federal Aviation Administration (FAA) Emissions and Dispersion Modeling System (EDMS) using Bureau of Transportation Statistics (BTS) T-100 Landing and Takeoff (LTO) and Terminal Area Forecast (TAF) data. The state of Missouri did not provide alternate emissions or input data, so EPA calculations were accepted.

For commercial marine vehicles, EPA's Office of Transportation and Air Quality (OTAQ) provided emission estimates based on grown 2002 emissions and 2008 Locomotive and Marine federal rule making. Again, EPA emission estimates were accepted.

For locomotives, the Eastern Regional Technical Advisory Committee (ERTAC Rail) provided emission estimates based on fuel use data from the American Association of Railroads (AAR), Surface Transportation Board (STB) Annual Reports, and railroad provided fleet and activity information. These estimates were accepted by Missouri.

EPA generates emissions data for commercial marine and locomotive sources using a method similar to the way emissions are generated for non-point sources. Therefore, 2008 NEI data for commercial marine and locomotive emissions, which are listed as

nonpoint emissions in the NEI data, need to be added to the nonroad mobile source category. See Section 3.3.1.4 for emission totals.

3.3.1.2 List of Source Categories and Emissions

The list of source categories and emissions in the five-county St. Louis Nonattainment Area is provided in Appendix E-5.

3.3.1.3 Source Category Documentation

The full documentation for nonroad categories follows in Appendix E-4.

3.3.1.4 Nonroad Source Emission Summary

Table 11 STLNA EPA Generated 2008 Nonroad Emissions by County (tons per year, excluding Marine and Rail Emissions)

County Name	NO_X	PM_{10}-Pri	$PM_{2.5}$-Pri	SO_2	VOC
Franklin County	665.82	67.91	64.73	11.77	945.16
Jefferson County	726.68	77.19	73.60	14.61	929.83
St. Charles County	1,893.56	179.78	171.98	37.05	1,948.52
St. Louis County	5,354.35	558.11	530.64	99.31	6,470.16
St. Louis City	794.90	55.98	53.25	9.74	1,066.00
Totals	**9,435.31**	**938.97**	**894.20**	**172.48**	**11,359.67**

Table 12 STLNA Marine and Rail Emissions by County (tons per year)

County Name	NO_X	PM_{10}-Pri	$PM_{2.5}$-Pri	SO_2	VOC
Franklin County	1,185.21	40.37	37.15	12.39	59.94
Jefferson County	376.05	12.92	12.17	11.56	14.31
St. Charles County	1,051.65	37.58	35.65	40.52	37.13
St. Louis County	1,149.43	39.56	36.68	19.77	53.86
St. Louis City	8,258.16	293.25	283.73	467.38	191.26
Totals	**12,020.50**	**423.69**	**405.37**	**551.61**	**356.50**

Table 13 STLNA Total Nonroad Mobile Source Emissions by County (tons per year)

County Name	NO_X	PM_{10}-Pri	$PM_{2.5}$-Pri	SO_2	VOC
Franklin County	1,851.03	108.28	101.88	24.16	1,005.10
Jefferson County	1,102.73	90.11	85.77	26.17	944.14
St. Charles County	2,945.21	217.36	207.63	77.57	1,985.65
St. Louis County	6,503.78	597.67	567.32	119.08	6,524.02
St. Louis City	9,053.06	349.23	336.98	477.12	1,257.26
Totals	**21,455.81**	**1,362.66**	**1,299.57**	**724.09**	**11,716.17**

3.3.2 Onroad Mobile Sources

Onroad emission sources are also known as highway sources. They include vehicles used on roads for transportation of passengers or freight. The emissions from internal combustion engines in these vehicles are included in this category. Emissions of particulates entrained by the motion of the vehicle or road contact are included in the nonpoint category.

3.3.2.1 Mobile Model Choice

EPA released the Mobile Vehicle Emission System (MOVES) in December of 2010, and MOVES is now the official model to use for mobile emissions modeling. MOVES was chosen because it is the official model for future inventories and to ensure that grown 2022 emissions and budgets will be calculated consistently. 2008 mobile emissions were initially created using Mobile6.2 via NMIM for the St. Louis nonattainment area for the purpose of submitting state wide emissions data for EPA's 2008 National Emissions Inventory (NEI). The NMIM NCD input data was updated with Missouri specific information. Local VMT data, vehicle registration distributions, and meteorology data from the updated NCD were converted to MOVES formatting using EPA provided conversion workbooks.

MOVES is a completely redesigned model, not just an updated version of the previous Mobile model. The way MOVES calculates emissions has changed to reflect EPA's more current understanding of the emissions produced by vehicles and the various factors that affect the emissions. NO_X emissions were found to be higher because of the larger portion extended idling of heavy duty vehicles contributes to the emissions total. $PM_{2.5}$ emissions were also higher because of a better understanding of the effect of stop and go traffic, which has a significant impact on emissions in highly urban areas, such as the St. Louis nonattainment area. As a result of these changes to the model, MOVES produced higher emissions estimates for both 2008 and 2022 than were originally created with NMIM.

3.3.2.2 Mobile Model Inputs

Local VMT data was gathered from East-West Gateway at the county level. This data is listed in Table 14.**Error! Reference source not found.**

The road type distribution in the baseyearvmt table from the NCD was used to distribute the county level VMT to road type. EPA's VMT converter workbook was then used to produce MOVES input tables.

An age distribution for light duty vehicles was created from a list of Vehicle Identification Numbers (VINs) contained in vehicle registration records from the

Missouri Department of Revenue. The VINs were decoded into model year and MOBILE6 vehicle classes by ESP Data Solutions, Inc, a private contractor. A specific registration distribution was created for the five county Missouri portion of the St. Louis Nonattainment area. This data updated the BaseYearVMT Table and the CountyYear Table. The vehicle distribution was converted to MOVES age distribution table using EPA's VMT converter workbook. The registration data was also used to create the MOVES vehicle population input tables. Vehicle counts were converted from Mobile 6.2 vehicle classes to MOVES source types using the source type fractions from the Source Type Pop Fractions table in EPA's VMT converter workbook. The vehicle distribution is listed in Table 15.

MOVES base data was used for all other inputs, after reviewing the data to ensure accuracy. The base fuel supply tables in MOVES were used for the runs, as they already took into account the reformulated gasoline used in the St. Louis nonattainment area. A separate input database was created for each county, using county specific data where possible. The MOVES input tables, other than default EPA templates, are included in Table 16 through Table 31.

Table 14 2008 Vehicle Miles Traveled by County

County FIPS	*County_Name*	*VMT* in Million Miles*	*County FIPS*	*County_Name*	*VMT* in Million Miles*
1	Adair County	159.4784	121	Macon County	242.8909
3	Andrew County	319.5966	123	Madison County	138.1476
5	Atchison County	196.4741	125	Maries County	122.7927
7	Audrain County	240.2153	127	Marion County	354.5883
9	Barry County	356.2431	129	Mercer County	52.8821
11	Barton County	228.2903	131	Miller County	348.3599
13	Bates County	276.5227	133	Mississippi County	241.8438
15	Benton County	213.8250	135	Moniteau County	141.0637
17	Bollinger County	117.7653	137	Monroe County	91.6368
19	Boone County	1,484.7484	139	Montgomery County	381.1052
21	Buchanan County	751.9344	141	Morgan County	221.8110
23	Butler County	488.9247	143	New Madrid County	483.9027
25	Caldwell County	154.1807	145	Newton County	791.7511
27	Callaway County	913.0340	147	Nodaway County	188.0544
29	Camden County	491.0100	149	Oregon County	151.1144
31	Cape Girardeau County	722.6664	151	Osage County	176.1925
33	Carroll County	96.9629	153	Ozark County	115.5051
35	Carter County	122.2928	155	Pemiscot County	491.2463
37	Cass County	947.9729	157	Perry County	299.3293
39	Cedar County	113.8193	159	Pettis County	406.5007
41	Chariton County	85.0137	161	Phelps County	711.2055
43	Christian County	721.9733	163	Pike County	276.9507
45	Clark County	139.0347	165	Platte County	1,363.4685
47	Clay County	2,256.7113	167	Polk County	355.0242
49	Clinton County	320.3453	169	Pulaski County	537.7921
51	Cole County	618.3292	171	Putnam County	52.0246
53	Cooper County	479.2263	173	Ralls County	202.9427

County FIPS	*County_Name*	*VMT* in Million Miles*
55	Crawford County	491.5010
57	Dade County	77.8041
59	Dallas County	193.3356
61	Daviess County	267.3748
63	DeKalb County	199.1815
65	Dent County	149.0151
67	Douglas County	127.5733
69	Dunklin County	317.1931
71	Franklin County	1,636.7261
73	Gasconade County	156.4525
75	Gentry County	58.3613
77	Greene County	2,404.9309
79	Grundy County	80.0101
81	Harrison County	274.5483
83	Henry County	310.2750
85	Hickory County	97.5059
87	Holt County	259.7343
89	Howard County	99.7101
91	Howell County	470.7985
93	Iron County	126.2972
95	Jackson County	6,713.6034
97	Jasper County	1,067.1157
99	Jefferson County	1,884.7099
101	Johnson County	499.5025
103	Knox County	57.7446
105	Laclede County	652.5356
107	Lafayette County	692.2315
109	Lawrence County	656.1909
111	Lewis County	166.5792
113	Lincoln County	495.2502
115	Linn County	153.6966
117	Livingston County	170.1267
119	McDonald County	330.7242

County FIPS	*County_Name*	*VMT* in Million Miles*
175	Randolph County	289.3356
177	Ray County	190.6346
179	Reynolds County	88.8169
181	Ripley County	110.1861
183	St. Charles County	2,727.9563
185	St. Clair County	182.8044
186	Ste. Genevieve County	398.6384
187	St. Francois County	548.1491
189	St. Louis County	11,925.1835
195	Saline County	463.6895
197	Schuyler County	62.0992
199	Scotland County	51.6444
201	Scott County	471.9991
203	Shannon County	119.4785
205	Shelby County	99.2628
207	Stoddard County	363.2309
209	Stone County	312.0035
211	Sullivan County	65.6205
213	Taney County	642.9550
215	Texas County	322.3266
217	Vernon County	345.9822
219	Warren County	524.8759
221	Washington County	220.3597
223	Wayne County	183.2741
225	Webster County	662.7641
227	Worth County	18.6762
229	Wright County	278.1377
510	St. Louis City	3,450.4882

*From MoDOT except for Cass, Clay, Jackson, and Platte (MARC) and Franklin, Jefferson, St. Charles, St. Louis, and St. Louis City (East-West Gateway)

Table 15 Missouri Registration Distribution

Vehicle Class	Vehicle Model Year Population Percentage Per Vehicle Classification												
	2008	**2007**	**2006**	**2005**	**2004**	**2003**	**2002**	**2001**	**2000**	**1999**	**1998**	**1997**	**1996**
LDV	0.0248	0.0564	0.0666	0.0649	0.0653	0.0632	0.0633	0.0679	0.0675	0.0652	0.0604	0.0501	0.0488
LDT1	0.0130	0.0345	0.0103	0.0666	0.0759	0.0255	0.0713	0.0780	0.0859	0.0487	0.0474	0.0398	0.0379
LDT2	0.0179	0.0593	0.0700	0.0750	0.0840	0.0759	0.0728	0.0808	0.0671	0.0640	0.0563	0.0522	0.0427
LDT3	0.0161	0.0734	0.0630	0.0760	0.0785	0.0842	0.0838	0.0728	0.0624	0.0539	0.0561	0.0365	0.0328
LDT4	0.0153	0.0843	0.1358	0.0771	0.0953	0.1119	0.0736	0.0461	0.0564	0.0549	0.0715	0.0395	0.0342
HDV2b	0.0078	0.0468	0.0483	0.0729	0.0660	0.0808	0.0871	0.0713	0.0773	0.0671	0.0642	0.0310	0.0519
HDV3	0.0066	0.0628	0.0602	0.0961	0.0876	0.0681	0.0715	0.0613	0.0774	0.0669	0.0734	0.0272	0.0331
HDV4	0.0040	0.0200	0.0638	0.0404	0.0338	0.0366	0.0385	0.0413	0.0653	0.0781	0.0821	0.0383	0.0630
HDV5	0.0187	0.1207	0.0664	0.0804	0.0535	0.0639	0.0560	0.0450	0.0578	0.0951	0.0899	0.0465	0.0572
HDV6	0.0311	0.0355	0.1005	0.0865	0.0529	0.0268	0.0212	0.0199	0.0840	0.0765	0.0685	0.0572	0.0591

Vehicle Class	Vehicle Model Year Population Percentage Per Vehicle Classification												
	2008	**2007**	**2006**	**2005**	**2004**	**2003**	**2002**	**2001**	**2000**	**1999**	**1998**	**1997**	**1996**
HDV7	0.0182	0.0324	0.1250	0.1080	0.1033	0.0772	0.0847	0.0669	0.0285	0.0427	0.0285	0.0253	0.0281
HDV8a	0.0136	0.0110	0.0524	0.0497	0.0565	0.0513	0.0420	0.0301	0.0426	0.0791	0.0570	0.0386	0.0354
HDV8b	0.0189	0.0726	0.2263	0.0348	0.0639	0.0957	0.0899	0.0552	0.0522	0.1363	0.0697	0.0305	0.0203
HDBS	0.0343	0.0556	0.0925	0.0556	0.1004	0.0587	0.0623	0.0351	0.0489	0.0657	0.0669	0.0678	0.0426
HDBT	0.0060	0.0045	0.0132	0.0144	0.0138	0.0291	0.0378	0.0258	0.0249	0.0390	0.0351	0.0309	0.0351
MC	0.0190	0.0646	0.1035	0.1096	0.1172	0.0874	0.0922	0.0713	0.0610	0.0435	0.0360	0.0255	0.0208
	1995	**1994**	**1993**	**1992**	**1991**	**1990**	**1989**	**1988**	**1987**	**1986**	**1985**	**1984**	
LDV	0.0390	0.0420	0.0313	0.0274	0.0213	0.0184	0.0138	0.0121	0.0083	0.0065	0.0049	0.0106	
LDT1	0.0443	0.0211	0.0168	0.0210	0.0189	0.0193	0.0184	0.0363	0.0582	0.0433	0.0250	0.0426	
LDT2	0.0292	0.0287	0.0266	0.0215	0.0157	0.0149	0.0096	0.0096	0.0076	0.0054	0.0042	0.0090	
LDT3	0.0322	0.0423	0.0338	0.0207	0.0181	0.0106	0.0112	0.0104	0.0070	0.0067	0.0058	0.0117	
LDT4	0.0201	0.0158	0.0145	0.0101	0.0074	0.0055	0.0052	0.0063	0.0074	0.0045	0.0014	0.0059	
HDV2b	0.0350	0.0393	0.0244	0.0196	0.0151	0.0122	0.0124	0.0154	0.0097	0.0062	0.0102	0.0280	
HDV3	0.0266	0.0340	0.0223	0.0165	0.0122	0.0126	0.0134	0.0118	0.0126	0.0096	0.0098	0.0264	
HDV4	0.0504	0.0723	0.0647	0.0308	0.0247	0.0243	0.0238	0.0270	0.0198	0.0121	0.0128	0.0321	
HDV5	0.0517	0.0217	0.0147	0.0083	0.0067	0.0110	0.0113	0.0125	0.0080	0.0012	0.0000	0.0018	
HDV6	0.0557	0.0389	0.0134	0.0152	0.0093	0.0162	0.0292	0.0196	0.0184	0.0240	0.0062	0.0342	
HDV7	0.0253	0.0321	0.0174	0.0202	0.0158	0.0166	0.0139	0.0226	0.0162	0.0178	0.0103	0.0230	
HDV8a	0.0333	0.0786	0.0447	0.0381	0.0239	0.0228	0.0291	0.0360	0.0277	0.0261	0.0163	0.0641	
HDV8b	0.0087	0.0015	0.0015	0.0029	0.0044	0.0044	0.0029	0.0044	0.0000	0.0000	0.0015	0.0015	
HDBS	0.0489	0.0327	0.0185	0.0146	0.0106	0.0095	0.0114	0.0173	0.0024	0.0035	0.0032	0.0410	
HDBT	0.0830	0.0836	0.0492	0.0441	0.0267	0.0399	0.0609	0.0333	0.0558	0.0540	0.0351	0.1248	
MC	0.0189	0.0171	0.0122	0.0119	0.0073	0.0063	0.0063	0.0064	0.0054	0.0068	0.0097	0.0401	

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Table 16 2008 Source Type Population

			Source Type Population by County				
YearID	SourceTypeName	SourceTypeID	Franklin	Jefferson	St Charles	St Louis County	St Louis City
2008	Motorcycle	11	6,067	13,018	11,151	19,243	3104
2008	Passenger Car	21	46,568	98,009	144,441	527,148	125,776
2008	Passenger Truck	31	45,890.24	82,509.19	110,385.78	303,295.72	59,405.61
2008	Light Commercial Truck	32	16,768.76	28,420.81	35,913.22	97,845.28	20,194.39
2008	Refuse Truck	41	8.25	41	35.5	93.5	69.5
2008	Single Unit Short-haul Truck	42	24.75	123	106.5	280.5	208.5
2008	Single Unit Long-haul Truck	43	302.08	541.2	549.04	2,709.24	661
2008	Motor Home	51	21.53	19.34	19.44	50.14	16.25
2008	School Bus	52	813.93	900.99	1,019.79	3,623.55	1,249.2
2008	Transit Bus	53	61.05	66.99	76.07	270.27	92.6
2008	Intercity Bus	54	44.26	71.09	82.23	378.69	143.45
2008	Combination Short-haul Truck	61	370.31	324.37	327.86	791.19	247.5
2008	Combination Long-haul Truck	62	306.84	257.02	257.57	544.92	160

Table 17 2008 Annual VMT by HPMS Vehicle Type, County, and Year

			HPMSBaseYearVMT by County				
HPMSVtypeID	HPMSVtypeName	YearID	Franklin	Jefferson	St. Charles	St. Louis	St. Louis City
10	Motorcycles	2008	11,619,323	13,841,651	20,770,584	91,989,970	26,665,063
20	Passenger Cars	2008	707,169,172	811,173,607	1,171,243,667	5,115,865,231	1,477,495,621
30	Other 2 axle-4 tire vehicles	2008	799,130,600	924,394,839	1,342,595,411	5,875,722,138	1,702,465,533
40	Buses	2008	4,781,820	5,578,789	8,183,119	35,928,481	10,469,862
50	Single Unit Trucks	2008	29,351,955	33,386,793	47,634,481	207,228,073	59,856,119
60	Combination Trucks	2008	84,673,330	96,333,716	137,528,782	598,448,609	173,536,046

Table 18 Age Distribution by Source Type

	Source Type ID												
AgeID	**11**	**21**	**31**	**32**	**41**	**42**	**43**	**51**	**52**	**53**	**54**	**61**	**62**
0	0.019	0.0248	0.016038	0.015215	0.006	0.006	0.03372	0.019407	0.022549	0.022677	0.024421	0.018826	0.017834
1	0.0646	0.0564	0.059034	0.058508	0.0045	0.0045	0.054157	0.048521	0.039325	0.03937	0.032671	0.049995	0.052613
2	0.1035	0.0666	0.063189	0.062229	0.0132	0.0132	0.092687	0.158149	0.129508	0.130555	0.106219	0.16227	0.169835
3	0.1096	0.0649	0.073971	0.073529	0.0144	0.0144	0.057163	0.057986	0.082002	0.084645	0.091592	0.052692	0.04403
4	0.1172	0.0653	0.081725	0.079405	0.0138	0.0138	0.098055	0.068814	0.07432	0.076743	0.07138	0.066656	0.063479
5	0.0874	0.0632	0.072225	0.07206	0.0291	0.0291	0.05743	0.075516	0.060754	0.062113	0.04642	0.077218	0.080584
6	0.0922	0.0633	0.075227	0.075017	0.0378	0.0378	0.060728	0.071294	0.059753	0.061551	0.046468	0.072242	0.074392
7	0.0713	0.0679	0.075731	0.074101	0.0258	0.0258	0.034794	0.048222	0.045101	0.04668	0.038418	0.04791	0.047775
8	0.061	0.0675	0.069095	0.069315	0.0249	0.0249	0.049567	0.050551	0.053801	0.053336	0.05744	0.050259	0.049622
9	0.0435	0.0652	0.059343	0.060606	0.039	0.039	0.065329	0.101607	0.075238	0.074281	0.059218	0.106403	0.114631
10	0.036	0.0604	0.056546	0.058019	0.0351	0.0351	0.065952	0.060365	0.052757	0.052173	0.04901	0.061907	0.064481
11	0.0255	0.0501	0.045379	0.044021	0.0309	0.0309	0.066337	0.035034	0.038694	0.038608	0.041544	0.03448	0.033479
12	0.0208	0.0488	0.040069	0.041299	0.0351	0.0351	0.042714	0.030037	0.038252	0.038379	0.043733	0.028628	0.026173
13	0.0189	0.039	0.031719	0.032547	0.083	0.083	0.048635	0.022609	0.033622	0.033505	0.041779	0.020871	0.017769
14	0.0171	0.042	0.029341	0.030746	0.0836	0.0836	0.033323	0.026945	0.032499	0.031744	0.038573	0.026434	0.025331
15	0.0122	0.0313	0.025132	0.025766	0.0492	0.0492	0.018302	0.014853	0.01522	0.015277	0.015313	0.014766	0.014626
16	0.0119	0.0274	0.020261	0.020238	0.0441	0.0441	0.01489	0.014543	0.016624	0.016485	0.018482	0.014281	0.013778
17	0.0073	0.0213	0.01591	0.015912	0.0267	0.0267	0.010657	0.011093	0.012019	0.01218	0.012215	0.010861	0.010491
18	0.0063	0.0184	0.014002	0.013972	0.0399	0.0399	0.009968	0.011696	0.014667	0.014636	0.016859	0.011229	0.010394
19	0.0063	0.0138	0.011117	0.011398	0.0609	0.0609	0.012691	0.012448	0.018417	0.017168	0.026192	0.012123	0.011221
20	0.0064	0.0121	0.014109	0.014268	0.0333	0.0333	0.018084	0.014903	0.019136	0.018141	0.024946	0.014734	0.014172
21	0.0054	0.0083	0.015761	0.015219	0.0558	0.0558	0.00363	0.01022	0.014831	0.014247	0.019752	0.009773	0.008829
22	0.0068	0.0065	0.011686	0.011205	0.054	0.054	0.00501	0.010636	0.017272	0.016478	0.024234	0.009966	0.008574
23	0.0097	0.0049	0.00791	0.008124	0.0351	0.0351	0.003627	0.006385	0.007661	0.00744	0.00919	0.006293	0.006072
24	0.013837	0.003694	0.00582	0.006825	0.022815	0.022815	0.003017	0.003218	0.003631	0.003569	0.004095	0.003185	0.003108
25	0.019738	0.002785	0.004029	0.004856	0.01483	0.01483	0.002668	0.001864	0.001955	0.001889	0.002204	0.001885	0.001903

	Source Type ID												
AgeID	**11**	**21**	**31**	**32**	**41**	**42**	**43**	**51**	**52**	**53**	**54**	**61**	**62**
26	0.006525	0.002099	0.002201	0.002308	0.009639	0.009639	0.002379	0.001137	0.001109	0.001082	0.001162	0.001156	0.001183
27	0	0.001582	0.001069	0.001073	0.006266	0.006266	0.00214	0.00071	0.000645	0.000647	0.000595	0.000721	0.000739
28	0	0.00044	0.000253	0.000245	0.004073	0.004073	0.001953	0.000417	0.000378	0.000362	0.000398	0.000432	0.000454
29	0	0	0.000147	0.000139	0.002647	0.002647	0.001784	0.00024	0.000223	0.000197	0.000282	0.000256	0.000278
30	0	0	0.001957	0.001836	0.064531	0.064531	0.028609	0.010581	0.018036	0.013841	0.035194	0.011546	0.012147

Table 19 Inspection and Maintenance Data for 2008

Pol ProcessID	stateID	yearID	Source typeID	Fuel TypeID	IM ProgramID	Inspect Freq	Test StandardsID	Beg Model YearID	End Model YearID	Use IMyn	Compliance Factor
101	29	2008	21	1	1	1	11	1971	1995	Y	93.12
101	29	2008	21	1	10	1	51	1996	2006	Y	93.12
101	29	2008	31	1	1	1	11	1971	1995	Y	93.12
101	29	2008	31	1	10	1	51	1996	2006	Y	93.12
101	29	2008	32	1	1	1	11	1971	1995	Y	93.12
101	29	2008	32	1	10	1	51	1996	2006	Y	93.12
102	29	2008	21	1	1	1	11	1971	1995	Y	93.12
102	29	2008	21	1	10	1	51	1996	2006	Y	93.12
102	29	2008	31	1	1	1	11	1971	1995	Y	93.12
102	29	2008	31	1	10	1	51	1996	2006	Y	93.12
102	29	2008	32	1	1	1	11	1971	1995	Y	93.12
102	29	2008	32	1	10	1	51	1996	2006	Y	93.12
112	29	2008	21	1	7	1	41	1971	1995	Y	93.12
112	29	2008	21	1	8	1	43	1996	2006	Y	93.12
112	29	2008	31	1	7	1	41	1971	1995	Y	93.12
112	29	2008	31	1	8	1	43	1996	2006	Y	93.12
112	29	2008	32	1	7	1	41	1971	1995	Y	93.12
112	29	2008	32	1	8	1	43	1996	2006	Y	93.12
113	29	2008	21	1	7	1	41	1971	1995	Y	93.12

Pol ProcessID	stateID	yearID	Source typeID	Fuel TypeID	IM ProgramID	Inspect Freq	Test StandardsID	Beg Model YearID	End Model YearID	Use IMyn	Compliance Factor
113	29	2008	21	1	8	1	43	1996	2006	Y	93.12
113	29	2008	31	1	7	1	41	1971	1995	Y	93.12
113	29	2008	31	1	8	1	43	1996	2006	Y	93.12
113	29	2008	32	1	7	1	41	1971	1995	Y	93.12
113	29	2008	32	1	8	1	43	1996	2006	Y	93.12
201	29	2008	21	1	1	1	11	1971	1995	Y	93.12
201	29	2008	21	1	10	1	51	1996	2006	Y	93.12
201	29	2008	31	1	1	1	11	1971	1995	Y	93.12
201	29	2008	31	1	10	1	51	1996	2006	Y	93.12
201	29	2008	32	1	1	1	11	1971	1995	Y	93.12
201	29	2008	32	1	10	1	51	1996	2006	Y	93.12
202	29	2008	21	1	1	1	11	1971	1995	Y	93.12
202	29	2008	21	1	10	1	51	1996	2006	Y	93.12
202	29	2008	31	1	1	1	11	1971	1995	Y	93.12
202	29	2008	31	1	10	1	51	1996	2006	Y	93.12
202	29	2008	32	1	1	1	11	1971	1995	Y	93.12
202	29	2008	32	1	10	1	51	1996	2006	Y	93.12
301	29	2008	21	1	10	1	51	1996	2006	Y	93.12
301	29	2008	31	1	10	1	51	1996	2006	Y	93.12
301	29	2008	32	1	10	1	51	1996	2006	Y	93.12
302	29	2008	21	1	10	1	51	1996	2006	Y	93.12
302	29	2008	31	1	10	1	51	1996	2006	Y	93.12
302	29	2008	32	1	10	1	51	1996	2006	Y	93.12

Table 20 Fuel Formulation for 2008

Fuel FormulationID	Fuel SubtypeID	FuelSubtypeDesc	RVP	Sulfur Level	ETOH Volume	MTBE Volume	ETBE Volume	TAME Volume	Aromatic Content	Olefin Content
2302	12	Gasohol (E10)	11.2917	43.0622	10	0	0	0	20.2606	8.39154
2303	12	Gasohol (E10)	8.75115	46.6452	10	0	0	0	18.9623	8.14345
2304	12	Gasohol (E10)	6.84571	49.3325	10	0	0	0	17.9886	7.95739
2305	12	Gasohol (E10)	13.1972	40.375	10	0	0	0	21.2343	8.57759
20043	20	Conventional Diesel	0	43	0	0	0	0	0	0

Fuel FormulationID	Fuel SubtypeID	fuelSubtypeDesc	Benzene Content	e200	e300	biodiesel EsterVolume	cetaneIndex	PAHContent
2302	12	Gasohol (E10)	0.848747	56.4983	84.16	0	0	0
2303	12	Gasohol (E10)	0.763743	53.3414	85.1429	0	0	0
2304	12	Gasohol (E10)	0.69999	50.9738	85.88	0	0	0
2305	12	Gasohol (E10)	0.9125	58.8659	83.4229	0	0	0
20043	20	Conventional Diesel	0	0	0	0	0	0

Table 21 2008 Fuel Supply

FuelYearID	Month GroupID	Fuel FormulationID	Market Share	Market ShareCV
2008	1	2305	1	0.5
2008	1	20043	1	0.5
2008	2	20043	1	0.5
2008	2	2302	1	0.5
2008	3	2302	1	0.5
2008	3	20043	1	0.5
2008	4	20043	1	0.5
2008	4	2303	1	0.5
2008	5	2303	1	0.5
2008	5	20043	1	0.5
2008	6	20043	1	0.5
2008	6	2304	1	0.5
2008	7	2304	1	0.5

FuelYearID	Month GroupID	Fuel FormulationID	Market Share	Market ShareCV
2008	7	20043	1	0.5
2008	8	20043	1	0.5
2008	8	2304	1	0.5
2008	9	2304	1	0.5
2008	9	20043	1	0.5
2008	10	20043	1	0.5
2008	10	2303	1	0.5
2008	11	2302	1	0.5
2008	11	20043	1	0.5
2008	12	20043	1	0.5
2008	12	2302	1	0.5

Table 22 Average Monthly Temperatures by Hour of the Day for Franklin County in Fahrenheit

	MonthID											
HourID	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	25.8	29	39.1	48.4	55.9	68.2	70.9	67.1	60.6	49	38.4	24.7
2	24.8	27.4	37	46.4	54.7	67.1	69.6	66.2	60.8	47.9	38.4	24.7
3	23.8	26.3	35.8	45	53.6	66	68.8	65.4	60	47.1	37.5	24
4	22.8	25.3	34.5	44.1	52.6	65	68.1	64.8	59.1	46.5	36.8	23.5
5	22	24.9	33.5	43.2	51.7	64.1	67.5	63.9	58.6	45.7	36	23
6	21.4	24.2	32.6	42.7	51.1	63.5	66.8	63.4	58.2	45.1	35.3	22.5
7	21.2	23.8	32.1	42.7	52.6	65.7	68.2	63.9	57.9	44.6	34.7	22.8
8	21	23.4	32.4	45.3	56.2	69.3	71.4	67.6	60	45.9	34.2	22.3
9	22.2	24.9	36.4	48.9	59.6	72.9	75.2	71.7	63.8	50.9	37.1	23.8
10	26.6	27.8	40.5	52.5	63.2	76.2	78.5	75.7	67.8	56	41.5	27.4
11	31.2	31.1	44.7	55.7	66.4	79	81.3	78.9	71.4	60.5	45.6	31.7
12	36	34.3	48.5	58.5	68.8	81.3	83.6	81.2	74.4	63.9	49.3	36.1
13	39.6	37.2	51.7	61.5	70.6	83	85.6	82.9	76.5	66.1	51.9	39.7
14	42.4	39.5	53.9	63.3	72.1	84.3	87	84.1	77.9	67.5	54	42.2
15	44	41	55.6	64.9	73.6	85.1	88	84.9	78.7	68.4	55.1	43.9
16	44.4	41.6	56.3	65.8	74.3	85.5	88.1	85.1	78.7	68.5	55.1	44.1
17	43.2	41.4	56.1	65.6	74.3	85.2	87.7	84.7	77.9	67.4	53.7	42.2
18	39.4	39.9	54.8	64.6	73.3	84.1	86.7	83.3	75.8	64.2	50.1	37.8
19	35.2	37	51.7	62.1	71.3	82.3	84.6	80.4	71.3	58.9	46.8	34.4
20	32.8	34.9	47.9	58.2	67.3	79	81	75.9	67	55.9	44.8	32
21	31	33.6	45.7	55.6	63.2	74.6	76.9	72.5	65.1	54.1	43.1	30.1
22	29.6	32.2	43.9	53.4	60.7	72.2	75	70.6	63.8	52.7	41.9	28.4
23	28.2	30.9	42.3	51.5	58.9	70.7	73.4	69.2	62.5	51.3	40.7	27.1
24	27.2	29.9	40.5	50	57.2	69.3	72.1	68.1	61.4	50.2	39.5	25.7

Table 23 Average Monthly Percent Relative Humidity by Hour of the Day for Franklin County

	MonthID											
HourID	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	68.3	76	71.8	70.6	77	78.3	83.9	86.1	88.2	77	68.9	69.9
2	69	77.2	72.8	72.9	77.2	80.2	84.4	86.9	88.5	78.7	70.3	71.8
3	70.1	78	73.9	74.5	78.2	81.6	85.3	87.5	89.2	79.8	71.7	72.9
4	70.9	78.3	75.3	75.3	79.3	82.4	86.1	88.1	90.1	80.4	72.8	73.8
5	71.8	78.3	76.8	76.1	80.5	83.8	86.4	89.3	90.4	81.6	73.9	75.1
6	72.3	78.9	77.6	77	81.1	84.4	87.3	89.6	90.4	82.5	75	75.7
7	72	78.8	78.2	77.6	80.3	83	85.8	89	90.4	83.4	75.9	76.1
8	72	78.8	78.3	74.5	76.2	77.9	81.4	84.9	89.5	83.2	76.5	76
9	71.2	77.6	74.8	69.8	71.5	72.4	74.9	77.5	84.7	76.8	74.3	75.2
10	66.9	74.3	69.7	64.8	65.8	66.9	69.3	70.2	77.2	67.7	68.4	72.4
11	62	70.4	63.5	61.1	61.1	62.1	64.5	64.2	70.5	59.4	62.1	68.4
12	56.8	67	58.7	58.2	58.1	58.2	60.9	60	64.6	53.3	56.5	64.8
13	53	63.8	54.8	55	56.3	55.4	57.9	57.2	60.9	49.9	52.7	62.1
14	50.2	61.5	52.6	53	55.1	53.7	55.8	55.4	58.3	47.7	49.4	60.2
15	48.4	60	51	51.1	53.1	52.2	54.6	54.2	56.8	46.3	47.6	58.7
16	47.3	59.4	50.7	49.7	52.5	51.5	54.4	54	56.6	46	47.1	58
17	47.9	59.8	50.7	49.1	51.7	51.5	55.1	54.9	58.1	47.2	48.4	59.2
18	51.2	61.6	52.5	49.9	52.1	52.8	56.7	57.6	62.8	52.3	52.9	62.9
19	55.5	65.4	56.2	52.8	54.6	55.5	61.1	63.5	72.5	61.5	57.2	65.6
20	58.3	68.2	61	57.5	60.3	61.6	68.4	72.7	80.5	66.9	60	67
21	60.6	70.1	63.9	60.8	66.3	68.8	75.3	78.4	83.9	69.6	62.5	67.6
22	62.8	72	66.3	63.9	70.3	72.8	78.3	81.9	85.3	71.9	64.4	68.3
23	64.5	73.7	68.2	66.4	73.1	75	80.7	83.8	86.4	73.7	65.9	68.7
24	66.1	75.1	70.3	68.3	75.4	77	82.3	85.2	87.6	75.6	67.6	69.1

Table 24 Average Monthly Temperatures by Hour of the Day for Jefferson County in Fahrenheit

	MonthID											
HourID	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	25.6	28.3	38.5	47.4	55	68.3	70.1	67	60.2	48.6	37.5	24.2
2	24.7	26.8	36.3	45.5	53.8	67.3	68.8	66.1	60.4	47.7	37.3	24.2
3	23.7	25.7	35.2	44.3	52.8	66.3	68.1	65.3	59.5	46.9	36.4	23.2
4	22.5	24.8	34.2	43.3	51.8	65.2	67.5	64.6	58.9	46.3	35.8	22.8
5	22	24.2	33.3	42.6	50.9	64.5	66.8	63.9	58.2	45.4	35	22.3
6	21.2	23.5	32.3	42.3	50.5	63.8	66.2	63.4	57.9	44.8	34.3	21.8
7	20.8	23.1	31.8	42.3	52.1	66	67.6	63.9	57.6	44.3	33.7	22.1
8	20.8	22.9	32	44.9	55.7	69.6	70.8	67.6	59.9	45.6	33.5	21.6
9	22	24.2	35.7	48.4	58.9	73	74.5	71.6	63.7	50.7	36.6	23.2
10	26.2	27	39.5	51.7	62.4	76.3	77.6	75.6	67.6	55.8	41	27
11	30.7	30	43.6	54.7	65.5	78.9	80.3	78.7	71.3	60.2	45	31
12	35	33.2	47.1	57.1	67.7	81.1	82.5	80.8	74.2	63.7	48.6	35.2
13	38.3	35.7	50.1	59.7	69.3	82.8	84.3	82.5	76.4	65.8	51.1	38.8
14	41.2	37.9	52.3	61.6	70.4	83.9	85.6	83.7	77.7	67.2	53.2	41.1
15	42.9	39.2	53.7	62.9	71.7	84.6	86.6	84.4	78.5	68.1	54.3	42.8
16	43.3	40	54.5	63.8	72.6	84.9	86.9	84.4	78.6	68.1	54.3	43
17	42.1	39.8	54.3	63.5	72.6	84.6	86.5	84.2	77.8	67.1	52.9	41.1
18	38.5	38.3	53	62.6	71.6	83.6	85.4	82.7	75.6	63.9	49.1	36.9
19	34.4	35.7	50	60.1	69.7	81.8	83.4	79.9	71	58.7	45.7	33.8
20	32	33.6	46.8	56.8	65.8	78.6	79.9	75.6	66.7	55.6	43.7	31.5
21	30.3	32.1	44.6	54.1	62	74.4	76.1	72.3	64.7	53.7	41.9	29.8
22	29.1	31.2	42.7	52.2	59.7	72.2	74.1	70.4	63.3	52.3	40.7	27.9
23	28	29.9	41.4	50.3	57.6	70.7	72.6	69	62.1	50.9	39.5	26.8
24	27	29.1	39.7	48.9	56.2	69.4	71.3	68.1	61.1	49.7	38.4	25.1

Table 25 Average Monthly Percent Relative Humidity by Hour of the Day for Jefferson County

	MonthID											
HourID	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	67.9	75.6	72.4	70.8	76.6	76.7	83	85.5	87.6	77.2	68.8	69.6
2	69	77.1	73	73.1	76.8	78.3	83.8	86.6	87.6	78.3	70.2	71.1
3	70.1	78	74.1	74.4	77.6	79.9	84.6	86.9	88.5	80.1	71.3	72.5
4	71.2	78.2	75.2	75.5	78.7	81.2	85.2	87.8	88.8	80.7	72.1	73.1
5	71.8	78.2	76.1	76.1	79.5	82.3	85.8	88.4	89.4	81.9	73.2	74.4
6	72.3	78.8	77.6	76.9	80.1	83.2	86.3	88.7	89.4	82.8	74.3	75
7	72.6	78.8	78.2	77.3	79.3	81.3	85.2	88.4	89.4	83.4	75.2	75.3
8	72.3	78.4	78.5	73.9	75	76	80.5	84	88.2	83.2	75.5	75.6
9	71.1	77.2	75.4	69	70.7	70.4	73.8	76.7	83.2	77.1	73.4	74.8
10	67.1	74.2	70.2	64.4	65	64.8	68.5	69.4	76.1	67.5	67.5	71.7
11	62.2	70.5	64.4	60.9	60.3	60.1	63.7	63.8	69.5	58.9	61.3	68
12	57.2	67.1	59.9	58.5	57.6	56.1	60	59.5	63.9	52.9	56.2	64.6
13	53.7	64.7	56.4	55.6	56.1	53	57.4	56.9	60	49.3	52.6	62
14	50.9	62.1	54.1	53.4	54.8	51.8	55	55.1	57.9	46.8	49.5	59.8
15	48.8	60.8	53	51.6	53.4	50.2	53.7	54.1	56.4	45.5	47.7	58.3
16	47.7	59.9	52.5	50.1	52.4	49.5	53.5	54.1	56	45.4	47	57.9
17	48.1	60.1	52.7	49.7	52	49.5	53.9	54.8	57.5	46.4	48.3	59
18	51.3	61.6	54.4	50.7	52.1	50.5	55.6	57.6	62.3	51.7	52.9	62.7
19	55.6	65.2	58.2	54	54.5	53.5	59.7	63.5	71.7	61	57.3	65.3
20	58.2	68.3	62.5	58.4	60.3	59.2	67.1	71.6	79.3	66.7	59.9	66.6
21	60.5	70.2	65.3	61.8	66.2	66.5	73.7	77.6	82.9	69.6	62.9	67.3
22	62.5	71.9	67.5	64.5	70	70.6	77.2	81	84.6	71.8	64.5	68.2
23	64.2	73.6	69.5	67.3	73.2	72.7	79.5	83.2	85.8	73.7	66.3	68.4
24	65.8	74.7	71.3	68.7	75.3	74.9	81.1	84.3	86.7	75.8	67.8	69.1

Table 26 Average Monthly Temperatures by Hour of the Day for St. Charles County in Fahrenheit

	MonthID											
HourID	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	24.3	26.9	37.9	47.5	54.9	68.8	70.2	67.6	60.6	49.2	37.6	23.3
2	23.3	25.3	36.1	45.7	53.7	67.8	69	66.8	60.7	48.1	37.5	23.5
3	22.2	24.1	34.9	44.4	52.6	66.7	68.3	65.9	59.9	47.6	36.6	22.8
4	21.2	23.2	33.8	43.5	51.5	65.7	67.9	65.1	59.2	46.8	35.9	22
5	20.7	22.9	32.8	42.7	50.8	64.8	67.2	64.5	58.6	46	35	21.5
6	20.3	22.4	31.7	42.4	50.2	64.3	66.7	63.9	58.1	45.4	34.2	21.3
7	20.1	21.8	31.2	42.4	51.9	66.4	68	64.5	58	44.8	33.8	21
8	20.1	21.5	31.5	45	55.3	69.8	71	68	60.1	46.1	33.5	20.5
9	21.4	23.1	35.2	48.4	58.2	73	74.4	71.9	63.7	50.8	36.5	22.3
10	25.8	25.6	38.9	51.4	61.8	75.9	77.5	75.7	67.6	55.4	40.5	26
11	30.3	28.6	42.7	54.3	64.7	78.4	79.9	78.7	71.3	59.7	44.2	30.3
12	34.4	31.7	46.2	56.7	66.7	80.8	82.2	80.7	74.1	63.1	47.9	34.8
13	38	34.1	48.9	59.3	68	82.3	84.1	82.2	76.2	65	50.5	38.3
14	40.7	36.2	51	61.1	69.4	83.3	85.4	83.5	77.6	66.4	52.6	40.3
15	42	37.6	52.4	62.5	70.8	84	86.4	84.1	78.3	67.3	53.8	41.8
16	42	38.1	52.9	63.4	71.7	84.4	86.5	84.3	78.4	67.4	53.8	42.1
17	41.1	37.8	52.7	63.3	71.8	84.3	86	84	77.8	66.3	52.5	40.6
18	37.5	36.4	51.6	62.4	71	83.3	85	82.7	75.7	63.3	48.9	36.3
19	33.3	33.6	48.8	60.1	69.1	81.8	83	79.8	71	58.4	45.8	33.3
20	30.9	31.9	45.4	56.5	65.3	78.6	79.7	75.8	66.8	55.4	43.9	31
21	29	30.5	43.5	54	61.5	74.6	76	72.5	65	53.9	42.5	29.3
22	27.8	29.5	41.9	52.3	59.1	72.5	74	70.7	63.4	52.6	41.4	27.3
23	26.5	28.2	40.8	50.5	57.4	71.1	72.7	69.4	62.4	51.4	40	25.8
24	25.4	27.7	39	49.1	56	69.8	71.3	68.5	61.2	50.3	38.8	24.3

Table 27 Average Monthly Percent Relative Humidity by Hour of the Day for St. Charles County

	MonthID											
HourID	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	67.5	75.8	71.7	70.5	76.6	77.3	83.3	85.5	87.9	76.1	68.8	69.8
2	68.2	77	72.1	72.8	76.5	78.9	84.1	86.4	88.2	77.8	70.2	71.3
3	69.6	77.5	73.5	74.4	77.9	80.5	84.9	86.9	88.8	78.9	71.6	72.5
4	70.7	78.1	74.9	75.3	79.3	82.1	85.2	88.1	89.4	79.5	72.4	73.4
5	71.6	78.1	76.4	75.8	79.8	82.9	86.4	88.4	90.1	81	73.8	74.9
6	71.9	78	77.5	76.3	81	84.1	86.7	89	90.4	81.9	75.3	75.6
7	71.6	78.7	78.2	77	79.9	81.9	85.2	88.1	90	83.1	76.2	76.5
8	71.6	78.3	78.2	73	75.5	76.3	80.2	84	88.8	82.6	76.4	76.2
9	70.5	76.7	74.7	67.9	71.4	70.6	73.8	76.5	83.8	76.8	73.9	75
10	66.2	73.8	69.8	63.9	64.7	65.5	68.2	69	76.3	67.9	68.3	72.2
11	61.3	70.1	63.8	60.2	59.8	60.5	63.5	62.9	69.2	59.8	62.4	68.5
12	56.4	66.7	58.8	57.5	57	55.9	59.5	58.5	63.9	53.4	56.9	65.4
13	52.5	64	55.1	54.7	55.9	53.1	56.6	55.9	59.8	49.9	53.2	62.7
14	49.9	61.3	53	52.7	54.3	51.7	54.4	54	57.3	47.6	49.8	61.2
15	48.1	59.5	51.6	50.9	52.7	50.1	53.1	52.9	56	46.3	47.8	59.6
16	47.1	58.9	51.4	49.5	51.7	49.2	52.9	53	55.6	46	47.1	59.2
17	47.3	59.5	51.8	49.1	50.8	49.2	53.8	53.9	57.1	47	48.6	60.2
18	50.9	61.1	53.5	50.3	50.7	50.3	55.5	56.4	61.6	52.2	53.3	64
19	55.7	65.2	57.5	53.3	53.1	53.2	60	62.4	71.9	61	57.6	66.6
20	58.6	68.1	62.3	58.2	59	59.3	66.8	71.2	80.5	66.9	60.4	67.7
21	61.1	70.6	64.9	61.5	65.4	66.9	74	77.6	83.5	69.3	62.2	67.8
22	62.6	72.3	67.1	63.7	70.2	71.1	77.4	81.3	85.6	71.1	63.9	68.1
23	64	73.7	68.6	66.6	72.9	73.5	79.2	83.3	86.1	72.9	65.5	68.5
24	65.6	74.9	70.7	68.2	75	76	81.1	84.7	87.6	74.7	67.3	69.3

Table 28 Average Monthly Temperatures by Hour of the Day for St. Louis County in Fahrenheit

	MonthID											
HourID	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	25.5	28.1	39	48.2	56.2	70.2	71.8	68.8	62.4	50.7	38.8	24.4
2	24.5	26.6	37.3	46.2	55	69.1	70.6	68.1	62.5	49.8	38.6	24.6
3	23.6	25.2	36.1	45.1	53.8	68	69.9	67.2	61.6	49.1	37.8	23.9
4	22.7	24.5	35.1	44.3	52.8	67	69.6	66.5	60.9	48.4	37	23.2
5	21.9	23.9	34.2	43.6	52.1	66.1	68.9	65.9	60.4	47.6	36.3	22.5
6	21.4	23.4	33.1	43.3	51.6	65.6	68.4	65.3	59.9	47.1	35.6	22.5
7	21.2	23.1	32.6	43.3	53.2	67.7	69.7	65.8	59.8	46.6	35	22.5
8	21.2	22.7	32.9	45.7	56.5	70.9	72.5	69.4	61.9	47.9	34.9	22
9	22.5	24.1	36.4	48.9	59.4	73.9	75.7	72.8	65.2	52.2	37.8	23.9
10	26.6	26.7	39.8	51.8	62.5	76.8	78.5	76.6	68.7	56.7	41.5	27.2
11	30.8	29.5	43.3	54.6	65.2	79.3	81	79.5	72.2	60.7	45.1	31.1
12	34.9	32.5	46.7	56.8	67.1	81.6	83.1	81.4	74.8	63.9	48.4	35.1
13	38.2	35	49.4	59.3	68.4	83.1	84.8	83	76.8	65.8	50.9	38.7
14	41	37.1	51.3	61	69.4	84	86.2	84.1	78.3	67.2	52.8	40.8
15	42.5	38.5	52.7	62.4	70.8	84.8	87.2	84.8	79	67.9	54	42
16	42.5	39	53	63.2	71.6	85	87.3	84.9	79	68.1	54.1	42.5
17	41.6	38.6	53	63.1	71.9	84.9	86.8	84.6	78.4	67	52.8	40.8
18	38.1	37.2	51.7	62.4	70.9	84	85.9	83.2	76.3	64.2	49.5	37
19	34.2	34.6	49.1	60.1	69.3	82.5	83.9	80.5	72.3	59.9	46.6	34.4
20	31.8	32.9	46.3	56.8	65.6	79.5	80.7	76.8	68.5	57.1	44.8	32.3
21	30.1	31.6	44.4	54.4	62.5	76	77.4	73.9	66.6	55.5	43.4	30.6
22	29.2	30.8	42.6	52.8	60.2	73.9	75.8	72.1	65.2	54.1	42.2	28.4
23	27.9	29.5	41.7	51	58.4	72.4	74.4	70.8	64.1	52.9	41.1	27
24	26.8	28.8	40	49.6	57.2	71.2	73	69.8	63.1	51.7	39.9	25.3

Table 29 Average Monthly Percent Relative Humidity by Hour of the Day for St. Louis County

	MonthID											
HourID	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	67.3	75.9	71.8	70	75.9	75.8	82.3	85	87.4	75.9	68.9	70.2
2	68.1	77.1	72.2	72.6	76	78.1	83.3	85.8	87.7	77.6	70.3	71.8
3	69.5	78.3	73.3	74.2	77.4	80	84.2	86.7	88.6	79.1	71.7	72.9
4	70.3	78.5	74.4	74.7	78.5	81.3	84.7	87	89.5	79.6	72.5	73.8
5	71.5	78.5	75.9	75.6	79.3	82.4	85.9	87.9	89.8	81.1	73.6	75.7
6	72	78.8	77.7	76.1	80.5	83.3	86.2	88.4	90.1	82	75.4	76.4
7	71.7	79.1	78	76.4	79.4	81.1	84.7	88.2	90.1	82.9	76.3	76.7
8	71.4	78.4	78.6	72.5	75	75.6	79.8	83.2	88.6	82.4	76.6	76.6
9	70.3	77.2	74.8	67.9	71	70	73.4	76.3	83.3	76.7	74.1	75.2
10	66	74.2	69.9	63.7	65	64.7	67.9	68.6	76.2	67.6	68.2	72.7
11	61.4	70.5	64.6	60.2	60	60	63.2	62.8	69.1	59.4	62.3	68.9
12	56.7	67.1	59.6	57.8	57.5	55.2	59.2	58.4	63.5	53.1	57.5	66
13	52.8	64.6	56	54.9	56.4	52.3	56.3	55.8	59.6	49.5	53.4	63.2
14	49.8	62	53.9	53.1	55.1	51.3	54.2	53.9	57	47.2	50.4	61.2
15	47.8	59.9	52.4	51.3	53.5	49.5	52.5	52.9	55.5	45.9	48.4	59.9
16	46.8	59	52.7	49.9	52.7	48.6	52.5	52.9	55.3	45.5	47.5	59.2
17	47.2	59.7	52.9	49.6	51.4	48.6	53.2	53.9	56.8	46.6	48.8	60.5
18	50.6	61.2	54.8	50.5	51.4	49.7	54.7	56.4	61.5	51.4	53.2	64.1
19	55.1	65.1	58.5	54	53.5	52.4	58.9	62	70.6	59.1	57.2	66.5
20	58.2	68.2	62.5	58.2	59	57.9	65.8	69.8	78.6	65.1	60	67.9
21	60.2	70.4	65.3	61.4	64.5	64.3	72.3	76.1	82.2	68.2	62.1	68.3
22	61.9	72.1	67.7	63.6	69.2	69	75.5	80	84.2	70.4	64	68.6
23	63.7	73.8	69.3	66.6	72.5	71.6	77.7	82.2	85.3	72.5	65.7	69
24	65.2	75	71.1	68.3	74.6	74.3	80.1	83.9	86.5	74.6	67.4	69.7

Table 30 Average Monthly Temperatures by Hour of the Day for St. Louis City in Fahrenheit

	MonthID											
HourID	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	25.9	28.9	40.2	48.1	56	70.1	72.4	69.2	62.7	51.5	39.4	25.9
2	25	27.5	38.4	46.2	54.9	69.1	71.2	68.5	62.9	50.7	39.2	25.9
3	24	26.3	37.4	45.3	53.8	68	70.6	67.7	62.2	49.9	38.3	25
4	22.9	25.4	36.3	44.3	52.9	67	70.1	67	61.5	49.4	37.8	24.6
5	22.4	24.9	35.6	43.7	52.2	66.2	69.6	66.3	61	48.6	37.1	23.9
6	21.7	24.4	34.5	43.4	51.8	65.6	69.1	65.9	60.6	47.9	36.4	23.9
7	21.5	23.8	33.9	43.7	53.6	67.9	70.6	66.5	60.5	47.5	35.8	23.9
8	21.3	23.5	34.2	46	57	71.2	73.5	70.2	62.6	48.8	35.8	23.2
9	22.8	24.9	37.7	49.2	59.8	74.4	76.5	73.7	66	53.3	38.7	25.2
10	27	27.5	41	52.1	62.9	77.4	79.2	77.5	69.5	57.8	42.5	28.4
11	31	30.3	44.3	54.8	65.6	79.9	81.6	80.3	72.9	61.8	45.9	32
12	35	33	47.4	57	67.7	82.1	83.6	82.3	75.4	64.8	49.3	35.9
13	38.1	35.5	50.1	59.3	68.7	83.8	85.2	83.7	77.3	66.8	51.7	39.3
14	41.1	37.4	51.8	61	69.7	84.5	86.7	84.9	78.7	68.1	53.5	41.5
15	42.7	38.8	53.3	62.4	71.1	85.3	87.6	85.5	79.4	68.8	54.6	42.9
16	42.5	39.3	53.6	63.2	71.7	85.4	87.8	85.5	79.5	68.8	54.6	42.9
17	41.6	39.1	53.4	62.9	72	85.4	87.5	85.3	78.7	67.9	53.3	41.5
18	38.1	37.7	52.2	62.1	71.2	84.4	86.4	83.8	76.8	65.1	50	37.7
19	34.3	35.1	49.5	60.1	69.4	82.9	84.5	81.2	72.5	60.7	47.2	35
20	32.1	33.4	47	56.7	65.8	79.8	81.4	77.2	68.5	57.8	45.2	33.4
21	30.4	32.2	45	54.5	62.5	76	77.9	74.3	66.8	56.2	43.8	31.6
22	29.5	31.3	43.5	52.8	60.2	73.6	76.2	72.3	65.5	54.9	42.7	29.8
23	28.3	30.1	42.6	51	58.3	72.2	74.8	71.2	64.3	53.6	41.6	28.4
24	27.2	29.6	41.1	49.5	57.1	71	73.6	70.3	63.4	52.4	40.6	26.8

Table 31 Average Monthly Percent Relative Humidity by Hour of the Day for St. Louis City

	MonthID											
HourID	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	68	76.6	72.6	71.4	77	76.6	83.4	85.9	87.7	76.9	69.3	69.8
2	69	78.1	73.2	73.8	76.9	78.7	84.2	86.5	87.7	78	71	71.3
3	69.8	79	74	74.8	78	80.8	85.4	87	88	79.7	72.1	72.7
4	70.9	79	75.2	75.9	79.1	81.9	85.6	87.6	88.9	80.3	72.3	73.6
5	72.1	78.9	76.3	76.5	79.9	82.7	86.5	88.5	89.5	81.5	73.4	75.2
6	72.4	79.2	78.4	77.4	80.5	83.9	86.8	88.5	89.8	82.7	75.2	75.8
7	72.7	79.5	79	77.1	79.4	81.7	85.1	88.2	89.5	83.3	76.3	76.2
8	72.3	79.1	79.4	73.4	75.1	75.9	80.1	83.3	88.3	83.1	76.3	76.4
9	70.9	77.9	75.6	68.3	71	70	74	76.4	83	77	73.6	75
10	66.7	74.9	70.6	64.2	64.8	64.5	68.4	68.9	75.7	67.4	68	72.5
11	61.9	71.5	65.5	60.7	60.1	59.6	63.7	63.1	68.9	59.1	62.4	69
12	57.4	68.3	60.7	58.5	57.1	55.3	59.7	58.7	63.6	52.8	57.2	66.1
13	53.7	65.5	57	55.7	56.4	52	57.1	56.3	59.7	48.9	53.8	63.1
14	50.6	63.3	55.1	53.7	55.1	51.2	54.6	54.2	57	46.4	50.7	61.1
15	48.4	61.4	53.4	51.7	53.7	49.5	53.1	53.5	55.5	45.5	48.5	59.5
16	47.8	60.3	53.4	50.4	52.9	48.9	52.7	53.5	55.1	45.3	47.8	59.1
17	48	60.7	53.8	50.2	51.8	48.9	53.4	54.2	56.8	46.4	48.9	60.1
18	51.2	62.1	55.8	51.4	51.4	49.9	55.2	57.1	61.6	51.3	53.3	63.6
19	55.9	66	59.7	54.8	53.9	52.4	59.2	62.6	71.1	59.4	57.3	66.2
20	58.7	69.2	63.6	59.6	59.7	58.2	66.3	71.1	79.7	65.7	60.6	67.5
21	60.8	71.1	66.4	62.1	65.5	65	73.6	77.5	83.4	68.8	62.6	68.4
22	62.5	73.1	68.7	64.8	70	70.2	76.8	81.4	84.8	71	64.5	68.7
23	64.3	74.8	70.2	67.7	73.6	72.8	79.1	83.1	86.2	73.1	66.3	68.9
24	66.1	75.7	71.8	69.4	75.7	75.3	81	84.8	87.1	75.5	67.8	69.6

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3.3.2.4 Onroad Source Emissions Summary

The MOVES model runs were set up selecting all available gasoline and diesel fuel vehicle type combinations, all months, days, hours, and all road types. A separate run was set-up for each pollutant. The emissions were post-aggregated to the year level using MOVES.

A list of emissions by county and SCC is included in Appendices E-2 and E-3.

Table 32 summarizes the 2008 annual on-road emissions by county as calculated using MOVES 2010A for the Missouri counties located in the St. Louis Nonattainment area.

Table 32 STLNA Onroad Mobile Emissions Summary by county (tons per year)

County Name	CO	NH_3	NO_X	PM_{10}-Pri	$PM_{2.5}$-Pri	SO_2	VOC
Franklin County	15,676.63	77.75	4,165.14	137.51	131.56	30.12	1,499.34
Jefferson County	23,286.70	90.68	5,284.46	177.63	169.62	36.32	2,424.59
St. Charles County	33,662.39	133.29	7,745.99	272.43	260.16	54.30	3,476.51
St. Louis County	125,682.25	585.26	32,193.73	1,156.41	1,105.71	237.05	12,419.57
St. Louis City	32,605.02	169.20	9,119.82	334.16	319.94	68.87	3,132.81
Totals	**230,912.99**	**1,056.17**	**58,509.15**	**2,078.14**	**1,986.99**	**426.65**	**22,952.81**

4.0. Quality Assurance/Quality Control

4.1 Point Source QA/QC and Results

Prioritization

The EI Unit prioritizes review of those facilities that have the largest bulk emissions, specifically facilities with a Part 70 or Intermediate operating permit. While every data element collected helps to characterize the emission estimate, in evaluating the data, those fields most directly tied to the emissions calculation are given the highest priority. The MoEIS database system itself was quality assured to provide smooth data transfer from the state inventory to the NEI.

Methods

The EI Unit's general QA procedures utilize any and all of the techniques outlined in the EPA's Emission Inventory Improvement Program (EIIP) Technical Report Series Volume 6: Quality Assurance Procedures. The unit groups these techniques into two basic categories: Phase I, or Bottom-Up QA procedures, and Phase II, or Top-Down QA procedures. Top-Down Procedures analyze groups of emissions data that share a common trait and look for outliers, in keeping with the 'Reality Check' technique. Bottom-Up Procedures evaluate individual EIQs that are believed to be erroneous, whether due to a top-down analysis, errors found when entering the EIQ into the database, or inconsistencies brought to the attention of the EI Unit by a third party. These bottom-up procedures utilize the 'Peer Review', the 'Sample Calculations', or the 'Independent Audit' techniques. Note that any of these techniques could be found in either category; they have simply been mentioned in reference to the category in which they are most often found.

Quality checks are completed using computerized checks in the MoEIS automated system, exploiting its utility in ensuring that the necessary data is reported, and in providing an acceptable numeric range for certain fields. It streamlines the process of ensuring that all data fields required for the EPA's EIS system are present, are compatible with, and meet the needs of the EPA system. For example, emission release point records that were missing fields were corrected with the input of emission modelers and facility staff. Outdated Source Classification Codes (SCC), units of measure, and control device codes were removed, and required data fields for stack emission release points were added.

Phase I reviews address individual EIQs to reconcile discrepancies with emission data. Phase I reviews are generally done only on hardcopy submitted EIQs, but may also be done based on priority. Examples of EIQ issues that were encountered include throughputs and emission factors with inconsistent units of measure, emission unit identifiers that are different from previous EIQs, and MoEIS-calculated emissions that differ from the emissions on the hardcopy forms. Technical staff conducting these reviews worked with the companies to make corrections to their EIQs and place written

documentation of all changes in the hardcopy EIQ files stored in the fileroom. In addition, all changes made to EIQs are tracked in an electronic log file.

Phase II reviews take a top-down look at the emissions data. This phase involves running Access queries to identify potential issues to investigate further. The Phase II QA queries included ensuring condensable particulate emissions were reported, ensuring correct application of sulfur/ash content in emission factors, and reviewing emission trends by facility and industry type to identify any anomalies. In addition, point source data from other databases incorporated by the EPA into the EIS, such as the Toxics Release Inventory (TRI) and the Clean Air Markets Division (CAMD), will be reviewed and compared to MoEIS data. Prioritization of the largest sources, largest changes, and largest anomalies is a top consideration, as is realizing a meaningful emission difference within a reasonable amount of time. Any changes made to EIQs during the Phase II QA process will be done with input from the companies, and written documentation of all changes will be placed in the EIQ files stored in the fileroom and in electronic files.

Results

CAMD Data Comparison: Several emission units in Missouri are subject the Acid Rain Program or the NO_x Budget Trading Program, and these units report SO_x and NO_x emissions directly to EPA's Clean Air Markets Division (CAMD). These units were reviewed to ensure the same emission quantities were reported to EPA and to the APCP in their annual emissions report. Over 70% of all EIQ-reported SO_x and NO_x emissions were quality assured with the help of the CAMD database. Since the naming of the units between the two databases is not always identical, and not all units reported to the APCP are required to report to CAMD in either individual or grouped format, some manual analysis was done to compare emissions reported to the two databases.

The largest difference noted between the two databases was an underreporting of almost 270 tons to MoEIS compared to CAMD. Contact with the facility showed that the cause was a transcription error, and the MoEIS data was corrected. Due to prioritization, the six other facilities that showed reporting differences were not addressed, and their total difference was not more than the single NO_x correction that was completed.

Condensable PM Reporting: Missouri facilities were not required to report condensable emissions prior to emission year 2008, but they were reminded to report condensable starting with emission year 2008 in email or postcard form and in the EIQ packet. The inclusion of condensable PM data in the 2008 emission reporting year is important because it is an EPA triennial inventory year where data will be extensively quality assured for use in detailed air quality analyses and planning. Missouri is required to report condensable PM emissions in 2009 by EPA's Air Emissions Reporting Rule (AERR), 40 CFR Part 51.15, and data collection systems for separate condensable and filterable PM reporting in 2009 are in place. Quality assurance of the 2008 emissions data began with Part 70 and Intermediate operating permit holders who use Source Classification Codes (SCCs) that have condensable emission factors in the webFIRE emission factor database.

Identifying facilities: There are many fuel combustion processes that produce condensable emissions. For the vast majority of fuel combustion processes, the condensable emissions are accounted for in the total PM_{10} and $PM_{2.5}$ emission factors already in use. This is especially true for natural gas, diesel, and fuel oil combustion sources. Coal combustion sources, on the other hand, required additional analysis to determine if condensable emissions were included in the report. Six facilities correctly included condensable in their initial emission report and were contacted to verify those emissions. Seven facilities were identified that may not have included condensable emissions, but the omission did not amount to over 10 ton underreporting. Seventeen facilities that did not report condensable emissions were the highest priority and were contacted from August to October 2009 to correct their emission reports.

Emission Results: Condensable PM emissions added to those seventeen facilities account for over 3,700 tons of PM_{10} emissions statewide.

Table 33 Point Source QA - Condensable Additions

	Initial Inventory	Condensable Addition	17 Facility Total PM_{10} Inventory
17 facilities	3,049 tons PM_{10}	3,746 Tons PM_{10}	6,795 Tons PM_{10}

Ash/Sulfur Changes: The method of calculating emissions in MoEIS was changed from 2007 to the 2008 emission year. The previous equation used the throughput, emission factor, ash or sulfur content, and control efficiency to calculate emissions. The ash or sulfur term was added to the equation to assist facilities whose emission factor is an equation from AP-42 in the form [EF * A/S]. While the calculation method worked well for a limited number of facilities, it became a source of confusion for the larger group, and misinterpretation of the emission factor term by Air Program users necessitated a change to the calculation to remove the ash or sulfur term from the calculation. Communication of the change to facilities was done via the EIQ mailout and notations in the MoEIS online system. A review of submitted EIQs to ensure all affected facilities had accounted for the new calculation method showed only one facility that did not adjust the emission factor to account for the change. They were contacted to make the correction and it resulted in an over 4,000 ton increase in SO_x emissions compared to their initial report.

Interannual Variability- Facilities that reported over 20 tons of chargeable emissions were examined to find sources with large interannual variability. A list of 20 facilities was generated where plantwide chargeable emissions changed by more than 20%, and each of these facilities were contacted to verify the source of the increase or decrease. Four facilities reported an emission change due to emission factor or control device changes, and the other 16 facilities reported throughput changes were the cause of the emission differences. Since the cause of the emission variability has been documented, there is no cause for changes to the emissions report for these twenty facilities.

Local Agency QA – Four facilities in St. Louis City were selected for a detailed audit based on their level of emissions and variation from past year reporting. At the four facilities, over 20 emission units were audited to confirm throughput, appropriate emission factor use, appropriate control efficiency application, permitted equipment limits, and number of pollutants. Six emission units were found to be incorrectly reported in the 2008 emission report, with one facility having overreported almost 10 tons of PM_{10}, and another underreported 40 tons facility-wide. Phase 1 quality assurance steps were used on 14 facilities in Springfield, 7 facilities in St. Louis County, and twenty facilities in Kansas City. Throughputs, emission factors, incorrect calculations, and HAP reporting were reviewed for these sites.

Stack Parameters – In preparation for point source data submission to the NEI, the required data elements for stack emission release points were queried to ensure the data submittal could occur without errors. Of the over 2,600 stack release points associated with point source emission reports that are submitted to the 2008 NEI, almost 50% required quality assurance before they could be submitted. Three main quality assurance steps were taken to correct the stack data: missing data elements were filled in as possible, data elements that were out of range were quality assured, and previously submitted NEI data elements were compared to current Missouri emission report data to identify discrepancies. Filling in missing data elements took the most time because it required review of modeling files, contact with local agency staff, or contact with the facility. Out of range data elements were a much smaller portion of the quality assurance, but these were also corrected via modeling files and contact with the facility. Discrepancies between the EIS and 2008 Missouri EIQ data were reconciled by accepting the Missouri data instead of EIS data.

4.2 Nonpoint Source QA/QC

EI Unit staff has documented the following information for each nonpoint source category: source of data for activity, emission factors, allocation methodologies, nonpoint source SCCs covered, pollutants covered, and point source subtraction in Table 9. Much of the documentation for EPA categories appears at the NEI website: http://www.epa.gov/ttn/chief/net/2008inventory.html

Emission inventory staff participated in the ERTAC workgroup that developed many of the updated emission factors and methodologies used for 2008 emission estimates, and the resulting emission factors were checked against those used in EPA templates for accuracy. All nonpoint source categories in the 2008 NEI will be reviewed, including those for which EPA is developing emissions estimates. The emission estimates were compared to the 2005 NEI to identify outlying or missing categories.

Quality checks of the EPA excel worksheets showed that three worksheets had incorrect emission factors when compared to the ERTAC summary emission factor page, and these were corrected before emissions were submitted. Several categories had spreadsheet

templates that omitted HAP calculations, and these were amended prior to completing the categories. Spot checks were also done on the calculation pages to ensure formulas were followed, and no problems were found.

Quality assurance of the data included checks against 2002 NEI data submissions, and completeness checks for the number of counties, number of pollutants, order of magnitude, and correct units of measure. The priority data checks showed no errors, but there are a few source categories included in the 2002 NEI that were not included in the 2008 NEI due to time constraints (see section 3.2).

There are also a few categories that show large differences (>50%) between the 2002 NEI and the 2008 NEI, and virtually all are due to changes in emission factors, activity data, controls, covered categories, or calculation methods. The largest differences between the 2002 and 2008 NEI come in the graphic arts, degreasing, industrial surface coating, miscellaneous non-industrial solvents, and gas stations. The methods and source data for the graphic arts category have changed significantly between 2002 and 2008, and the source of activity data for 2002 did not cover all categories because of restricted release census bureau data. The emission factor for degreasing decreased by 50% from 2002 to 2008 after EPA and ERTAC review. The industrial surface coating category was assumed zero in 2002 but is non-zero in 2008. The miscellaneous non-industrial category did not have emissions for portable residential and commercial gas cans in 2002, but that category is included in 2008. Gas stations show a decrease in emissions from 2002 to 2008 that can be attributed to additional controls in the interim years. None of the large differences between 2002 and 2008 can be attributed to errors in the 2008 inventory that need correction.

4.3 Mobile Source QA/QC

4.3.1 Nonroad Source QA/QC

Per Appendix E-4, quality control and quality assurance were conducted throughout the nonroad modeling process. Data collected from various data sources were verified and correctly entered or transcribed into the model. In some instances, input values, i.e., temperatures and fuel values were double and/or triple checked for accuracy to insure they corresponded to Missouri DNR data. In addition, a spot-checking of the modeling results, including rerunning the model for those results in question, was performed to ensure reliability.

4.3.2 Onroad Source QA/QC

The data used for the modeling was originally collected for creating the 2008 NEI. Missouri DNR has conducted extensive quality assurance on the model inputs and the inputs have been reviewed by EPA. The inputs were converted to MOVES formatting using EPA conversion tools. The MOVES converted data was double and/or triple checked to ensure accuracy. In addition, a spot-checking of the modeling results,

including rerunning the model for those results in question, was performed to ensure reliability.